



COVER SHEET FOR PROPOSAL TO THE NATIONAL SCIENCE FOUNDATION

PROGRAM ANNOUNCEMENT/SOLICITATION NO./CLOSING DATE/if not in response to a program announcement/solicitation enter NSF 00-2		FOR NSF USE ONLY	
NSF 00-107	09/15/00	NSF PROPOSAL NUMBER	
FOR CONSIDERATION BY NSF ORGANIZATION UNIT(S) (Indicate the most specific unit known, i.e. program, division, etc.)		0097682	
CHE - CHE - Undergraduate Programs (continued)			

DATE RECEIVED	NUMBER OF COPIES	DIVISION ASSIGNED	FUND CODE	DUNS# (Data Universal Numbering System)	FILE LOCATION
				073131237	

EMPLOYER IDENTIFICATION NUMBER (EIN) OR TAXPAYER IDENTIFICATION NUMBER (TIN)	SHOW PREVIOUS AWARD NO. IF THIS IS <input type="checkbox"/> A RENEWAL <input type="checkbox"/> AN ACCOMPLISHMENT-BASED RENEWAL	IS THIS PROPOSAL BEING SUBMITTED TO ANOTHER FEDERAL AGENCY? YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> IF YES, LIST ACRONYMS(S)
341011998		

NAME OF ORGANIZATION TO WHICH AWARD SHOULD BE MADE Youngstown State University	ADDRESS OF AWARDEE ORGANIZATION, INCLUDING 9 DIGIT ZIP CODE Youngstown State University 410 Wick Avenue Youngstown, OH. 445550001
AWARDEE ORGANIZATION CODE (IF KNOWN) 0031450000	

NAME OF PERFORMING ORGANIZATION, IF DIFFERENT FROM ABOVE	ADDRESS OF PERFORMING ORGANIZATION, IF DIFFERENT, INCLUDING 9 DIGIT ZIP CODE
PERFORMING ORGANIZATION CODE (IF KNOWN)	

IS AWARDEE ORGANIZATION (Check All That Apply)
(See GPG II.D.1 For Definitions) FOR-PROFIT ORGANIZATION SMALL BUSINESS MINORITY BUSINESS WOMAN-OWNED BUSINESS

TITLE OF PROPOSED PROJECT **REU - Research Experience for Chemistry at Youngstown State University: A Bridge Between Four-Year Colleges and Ph.D. Research Universities**

REQUESTED AMOUNT \$ 261,750	PROPOSED DURATION (1-60 MONTHS) 36 months	REQUESTED STARTING DATE 05/01/01	SHOW RELATED PREPROPOSAL NO., IF APPLICABLE
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CHECK APPROPRIATE BOX(ES) IF THIS PROPOSAL INCLUDES ANY OF THE ITEMS LISTED BELOW

<input type="checkbox"/> BEGINNING INVESTIGATOR (GPG 1.A.3)	<input type="checkbox"/> VERTEBRATE ANIMALS (GPG II.D.12) IACUC App. Date _____
<input type="checkbox"/> DISCLOSURE OF LOBBYING ACTIVITIES (GPG II.D.1)	<input type="checkbox"/> HUMAN SUBJECTS (GPG II.D.12)
<input type="checkbox"/> PROPRIETARY & PRIVILEGED INFORMATION (GPG II.D.10)	Exemption Subsection _____ or IRB App. Date _____
<input type="checkbox"/> NATIONAL ENVIRONMENTAL POLICY ACT (GPG II.D.10)	<input type="checkbox"/> INTERNATIONAL COOPERATIVE ACTIVITIES: COUNTRY/COUNTRIES _____
<input type="checkbox"/> HISTORIC PLACES (GPG II.D.10)	<input type="checkbox"/> FACILITATION FOR SCIENTISTS/ENGINEERS WITH DISABILITIES (GPG V.G.)
<input type="checkbox"/> SMALL GRANT FOR EXPLOR. RESEARCH (SGER) (GPG II.D.12)	<input type="checkbox"/> RESEARCH OPPORTUNITY AWARD (GPG V.H)

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CERTIFICATION PAGE

Certification for Principal Investigators and Co-Principal Investigators:

I certify to the best of my knowledge that:

- (1) the statements herein (excluding scientific hypotheses and scientific opinions) are true and complete, and
 (2) the text and graphics herein as well as any accompanying publications or other documents, unless otherwise indicated, are the original work of the signatories or individuals working under their supervision. I agree to accept responsibility for the scientific conduct of the project and to provide the required progress reports if an award is made as a result of this proposal.

I understand that the willful provision of false information or concealing a material fact in this proposal or any other communication submitted to NSF is a criminal offense (U.S. Code, Title 18, Section 1001).

Name (Typed)	Signature	Social Security No.*	Date
PI/PD Daryl W Mincey		*ON FASTLANE SUBMISSIONS* SSNs are confidential and are not displayed	
Co-PI/PD Allen D Hunter			
Co-PI/PD John A Jackson			
Co-PI/PD Sherri R Lovelace-Cameron			
Co-PI/PD Timothy R Wagner			

Certification for Authorized Organizational Representative or Individual Applicant:

By signing and submitting this proposal, the individual applicant or the authorized official of the applicant institution is: (1) certifying that statements made herein are true and complete to the best of his/her knowledge; and (2) agreeing to accept the obligation to comply with NSF award terms and conditions if an award is made as a result of this application. Further, the applicant is hereby providing certifications regarding Federal debt status, debarment and suspension, drug-free workplace, and lobbying activities (see below), as set forth in Grant Proposal Guide (GPG), NSF 00-2. Willful provision of false information in this application and its supporting documents or in reports required under an ensuring award is a criminal offense (U. S. Code, Title 18, Section 1001).

In addition, if the applicant institution employs more than fifty persons, the authorized official of the applicant institution is certifying that the institution has implemented a written and enforced conflict of interest policy that is consistent with the provisions of Grant Policy Manual Section 510; that to the best of his/her knowledge, all financial disclosures required by that conflict of interest policy have been made; and that all identified conflicts of interest will have been satisfactorily managed, reduced or eliminated prior to the institution's expenditure of any funds under the award, in accordance with the institution's conflict of interest policy. Conflict which cannot be satisfactorily managed, reduced or eliminated must be disclosed to NSF.

Debt and Debarment Certifications

(If answer "yes" to either, please provide explanation.)

Is the organization delinquent on any Federal debt? Yes No

Is the organization or its principals presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency? Yes No

Certification Regarding Lobbying

This certification is required for an award of a Federal contract, grant, or cooperative agreement exceeding \$100,000 and for an award of a Federal loan or a commitment providing for the United States to insure or guarantee a loan exceeding \$150,000.

Certification for Contracts, Grants, Loans and Cooperative Agreements

The undersigned certifies, to the best of his or her knowledge and belief, that:

(1) No federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

AUTHORIZED ORGANIZATIONAL REPRESENTATIVE	SIGNATURE	DATE
NAME/TITLE (TYPED) Dr. Peter J. Kasvinsky / Graduate Dean		09/15/00
TELEPHONE NUMBER 330-742-3091	ELECTRONIC MAIL ADDRESS amgrad03@ysub.yso.edu	FAX NUMBER 330-742-1580

*SUBMISSION OF SOCIAL SECURITY NUMBERS IS VOLUNTARY AND WILL NOT AFFECT THE ORGANIZATION'S ELIGIBILITY FOR AN AWARD. HOWEVER, THEY ARE AN INTEGRAL PART OF THE INFORMATION SYSTEM AND ASSIST IN PROCESSING THE PROPOSAL. SSN SOLICITED UNDER NSF ACT OF 1950, AS AMENDED.

COVER SHEET FOR PROPOSAL TO THE NATIONAL SCIENCE FOUNDATION

FOR CONSIDERATION BY NSF ORGANIZATION UNIT(S) - continued from page 1
(Indicate the most specific unit known, i.e. program, division, etc.)

CHE - CHE - Chemistry of Materials
CHE - CHE - Organic Synthesis: Organometallic/Bioorganic
CHE - CHE - Analytical and Surface Chemistry: Analytical Separations and Measur
CHE - CHE - Analytical and Surface Chemistry: Electrochemistry and Surface Chem
CHE - CHE - Chemistry Education
CHE - CHE - Experimental Physical: Spectroscopy
CHE - CHE - Experimental Physical: Structure and Reactivity
CHE - CHE - Inorganic: Organometallic/Bioinorganic

Research Experience for Chemistry Undergraduates at Youngstown State University:

A Bridge Between Four-Year Colleges and Ph.D. Research Universities

A. Summary of Proposed Work:

The Department of Chemistry at Youngstown State University, YSU, will engage 10 students from nine northeast Ohio and northwest Pennsylvania colleges in exciting research projects covering the major fields of chemistry. In addition, five chemistry faculty members from the participating colleges will be involved in the same research experiences. This twelve-week summer program will involve a group of students that have not traditionally been involved in REU programs. YSU is centrally located within 100 miles of all four-year schools and possesses instrumentation and facilities not available to these participants at their four-year institutions. The mission and nature of the department of chemistry at YSU, facilitates students needing additional support to develop the skills necessary for advanced chemistry degrees. Research, writing, and oral presentation skills will be fostered. The fifteen-member department consists of 10 faculty members just starting their careers. Their research projects are timely and are supported by various state and national organizations, such as NSF, ACS-PRF, NIH, and Research Corporation. Students and faculty that participate in the program will be encouraged to continue the projects, initiated during the summer, with periodic visits to YSU and ongoing communication via the INTERNET. The presentation of their work at regional and national conferences will be expected. Adding to the experience at YSU will be the participation of Ohio State Ph.D. granting institutions. The outcome of this program will be undergraduates better prepared for endeavors involving research particularly Ph.D. granting degree programs.

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A Project Summary (not to exceed 1 page)	1	_____
B Table of Contents (NSF Form 1359)	1	_____
C Project Description (plus Results from Prior NSF Support) (not to exceed 15 pages) (Exceed only if allowed by a specific program announcement/solicitation or if approved in advance by the appropriate NSF Assistant Director or designee)	14	_____
D References Cited	4	_____
E Biographical Sketches (Not to exceed 2 pages each)	26	_____
F Budget (NSF Form 1030, plus up to 3 pages of budget justification)	5	_____
G Current and Pending Support (NSF Form 1239)	18	_____
H Facilities, Equipment and Other Resources (NSF Form 1363)	3	_____
I Special Information/Supplementary Documentation	1	_____
J Appendix (List below.) (Include only if allowed by a specific program announcement/ solicitation or if approved in advance by the appropriate NSF Assistant Director or designee)	_____	_____

Appendix Items:

*Proposers may select any numbering mechanism for the proposal. The entire proposal however, must be paginated. Complete both columns only if the proposal is numbered consecutively.

Climate of Student Activities:

The main focus of this proposal is to engage chemistry students from nine colleges in exciting research projects utilizing facilities and instrumentation not available at their individual schools. These four-year private institutions along with Youngstown State University, YSU, are members of an organization termed the Public Private Alliance, PPA. They include Hiram, Mount Union, Thiel, Grove City, Lake Erie, Morehead State, and Westminster Colleges and Walsh University. The primary goal of the PPA is to maximize student learning through the sharing of resources. At YSU, our instrumentation infrastructure, including equipment, facilities, and staff, is significantly more extensive than that of the private four-year colleges. Much of the instrumentation was acquired with the support of the National Science Foundation through ten CCIL and RUI grants over the last five years. Four of the faculty have received support through Research Corporation and ACS Petroleum Research Fund. **It is time for us to utilize this resource of faculty, facilities, and instrumentation in promoting the research experiences of a wider range of undergraduates in northeastern Ohio and northwestern Pennsylvania.** While we have a wealth of chemistry students in this area, most have not had the opportunity to take full advantage of REU programs and to integrate these into their academic year research efforts.

It is proposed that a more effective engagement of these students in the research experience would be established if an intensive summer research program involving PPA students and faculty at YSU, a site close to their home institution, existed. The program will involve ten four-year college students and five of their faculty mentors per year. The students will spend a minimum of forty hours per week for a twelve-week period. The first two weeks are in an intensive course, Chem 8: Chemistry Research and will include a written and oral research proposal. This will be done in consultation with their PPA and YSU research advisors. There will be 10-12 hours of contact time with the students in week 1, and then 35 hours for individual literature reviews and proposal development as they work with their research advisors in week 2. The content of this course will include research planning, design and execution including literature survey techniques, proposal writing and critical scientific analysis. This course is required of B and B chemistry majors at YSU and is the lecture part of an undergraduate capstone experience that involves research participation under the direction of a faculty member. Our students are required to prepare a written thesis on the completed project and give an oral presentation of their research efforts.

Within the first week, the PPA students will be introduced to our research-experienced faculty and their research groups of B, B, and M students. Our faculty have graduated from some of the most distinguished research institutions in the country. Many have post-doctoral experience and are dedicated to introducing undergraduates to the research experience. An average faculty research group consists of two to four M and three B students. There will be ample time for YSU faculty to devote individual and specialized mentoring of the PPA students. During this first week, PPA faculty will also develop/deepen their collaborative research projects with YSU research groups. PPA faculty and students will be encouraged to choose projects that can be continued and/or expanded at their own colleges after the summer program is over, with periodic trips back to YSU for discussions, joint group meetings, and instrumentation use.

They will also receive instruction in the operation of needed instrumentation and/or techniques. On the Friday of the second week, each REU-supported student will give a fifteen-minute seminar on their proposed research project for that summer to all research groups involved. A written version of their research proposal will also be submitted to the PI. The goal is to give the PPA students the necessary background, including a familiarity with the facilities at YSU, and confidence to quickly become a productive member of their respective research team.

Every two weeks, each REU supported student and other members of the research teams will give a fifteen-minute progress seminar. All summer research participants will attend the seminars. In addition, after six weeks, faculty and students from Ohio Ph.D. institutions such as

Case Western Reserve and Ohio State Universities and the Universities of Akron and Cincinnati will be invited to these seminars. YSU and these four schools currently are developing 2+3 Ph.D. cooperative research efforts. These efforts are described in four Integrative Graduate Education and Research Training proposals currently submitted to NSF. These efforts to encourage YSU students to further their education at Ph.D. schools are similar to YSU encouraging students at four-year colleges to become more involved in the research experience. Participants from the Ph.D. schools will be invited to describe their research efforts, and the formation of cooperative research teams involving four-year colleges, YSU as the bridging institution, and Ph.D. institutions will be supported. Chemistry faculty and students from other Ohio schools as well as those from Duquesne University and the University of Pittsburgh will also be invited to participate. A poster presentation (mini conference) will be held at the end of the twelve-week program. All the participants from the sixth-week meeting will be invited to review the products of the summer program. Again, it is expected that projects initiated over the summer will be continued at the four-year college, YSU, or one or more of the Ph.D. schools.

In addition to their research efforts, PPA students and faculty will participate in after hour and special activities including tours to the above mentioned Ph.D. schools and regional instrumentation and industrial research facilities, pizza parties, volleyball, softball, swimming, picnics, trips to local concerts, theatre, art exhibits, and amusement parks. Some of these activities will be department-wide while other will focus on research group participants. All of the PPA students and other YSU researchers will be housed in the Cafaro House Honors Dormitory. Each room is very spacious, air conditioned, and has access to the INTERNET. Off-campus students will be assigned a YSU counterpart to facilitate their acclimation to YSU. Some housing will be reserved for participating PPA faculty although, given the relatively short driving times (i.e., 0.5 to 1.5 hours) they are not expected to spend more than six overnight stays during the summer research program.

Ca. Student Projects:

The projects described below represent research projects that are current, often supported by external agencies, and appropriate for undergraduates. There are components of each that can be continued at the four-year institutions with periodic use of YSU instrumentation. If a project were to have a need for instrumentation not currently available at YSU, other institutions within the State of Ohio will be utilized through already established consortial agreements. CCD X-ray diffractometers, high-field (greater than 90 MHz) and solid-state NMRs, and various mass spectrometers such as MDIs are examples of such instrumentation.

Research Project for Prof. Stacey Lwery Bretz

Dr. Bretz's group focuses on the application of teaching and learning theories in cognitive science to the chemistry classroom, particularly as these efforts can work toward the goal of science literacy for all. Projects suitable for the student research experience would focus on those students interested in exploring and/or pursuing a career in teaching in the elementary or secondary classroom after graduation. Projects available to students include 1) development of guided inquiry laboratories, 2) development of alternative assessment measures, e.g., concept mapping and writing across the curriculum, and 3) understanding student misconceptions. Students would be expected to develop, pilot test, evaluate, and refine these measures beginning here at YSU in the summer and continuing through the school year in a local school district.

Research Project for Prof. Larry S. Curtin

Dr. Curtin has a variety of research interests including synthetic inorganic chemistry, self-assembled monolayers, conducting polymers and charge transfer salts, buckminsterfullerene and electrochemistry. Each student who works with Dr. Curtin receives extensive training in synthetic methodology, spectroscopy and cyclic voltametry.

One current project involves the synthesis and electrochemical characterization of self-assembled alkanethiol monolayers containing ferrocene dimers that are separated via alkane chains of varying lengths. The study is designed to provide fundamental insight into electron and charge transfer rates in alkanethiol monolayers containing multiple redox centers. In order to

produce useable devices based on monolayer chemistry, it is imperative to determine what factors affect the stability and electron transfer kinetics in these unusual systems. Ferrocene-containing dimers are outstanding candidates for this purpose because of their extremely rapid and reversible electron transfer properties.

Another current project involves the spectroelectrochemical characterization of conducting polymers in which C_6 has been covalently attached to the polymeric backbone. Upon the successful synthesis of C_6 substituted tetraazaannulene or pyrrole monomers, cyclic voltammetry will be used to produce the conducting polymeric films. Spectroelectrochemistry will be used to study the extent of interaction between the C_6 and the polymer when the polymer is in the conducting state (oxidized form) and the insulating state (reduced form). It is hoped that by incorporating C_6 into a polymer matrix that new materials can be produced which have novel electronic and catalytic properties.

The last current project combines the advantages of self-assembled monolayer chemistry with those of conducting polymeric films. We have recently demonstrated that cobalt phthalocyanine and cobalt octafluorophthalocyanine can be axially ligated to self-assembled monolayers, which terminate in a pyridine group. Multiple layers of metallocyanines can be constructed via repetitive exposure to solutions of pyrazine and phthalocyanine. Cobalt tetraazaannulene will be bound to the surface of a gold electrode via ligation to a pyridyl group that is exposed at the monolayer/solution interface. The bound monomer will then be polymerized via cyclic voltammetry. The overall goal of this research is to produce conducting polymeric films of a single molecular thickness. Such films should have enhanced performance in catalysis and molecular electronic devices because diffusion of counter-ions into/out of the film upon oxidation and reduction is eliminated.

Research Project for Prof. Janet E. Del Bene

Ab initio studies of hydrogen-bonded complexes are being carried out in this laboratory. Based on our previous work, hydrogen bonds have been characterized as traditional, proton-shared, and ion-pair. One aim of our research is to characterize the structural and IR and NMR spectroscopic properties of each hydrogen bond type. In supervision, undergraduate students could carry out meaningful investigations of particular hydrogen-bonded complexes. They could compute equilibrium structures and harmonic spectra, and generate potential energy surfaces which would be used subsequently to obtain anharmonic dimer- and proton-stretching frequencies.

Research Project for Prof. Allen Hunter

Dr. Hunter has several areas of research interest from which the students can choose research projects. The first involves the synthesis and characterization of novel organometallic and organofluorine polymers having conjugated backbones and/or side chains. These materials exhibit unusually high thermal stabilities and have the potential for applications related to their electrical conductivity and non-linear optical properties. This project would typically involve the new materials related to those previously synthesized by other undergraduates in the Hunter group and the exploration of their structure property relationships.

The second project is in the area of Chemical Education where Hunter has active NSF support and works with collaborators at both the college and pre-college level. This project would be aimed at a student interested in pursuing a career as a science teacher after graduation. The student will join a project team consisting of YSU and external faculty and active high school chemistry teachers to develop and pilot test a new curriculum model at the pre-college or freshman level. During the subsequent school year, the student would be involved in evaluating the effectiveness of these teaching materials at either their own institution or at a participating high school.

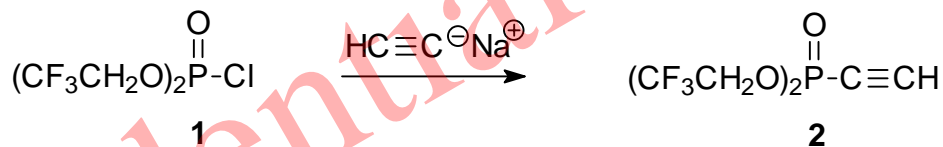
Research Project for Prof. John Jackson

Synthesis of Bis(trifluoroethyl)Phosphonoalkynes"

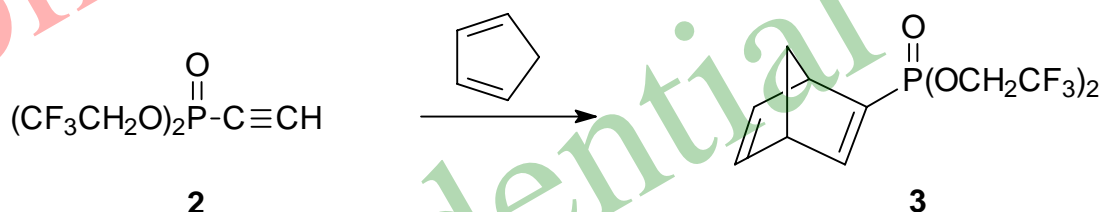
We have recently published an improved synthesis of bis(trifluoroethyl)phosphorochloridate (1) which we believe will be a versatile reagent for preparation of more

elaborate phosphonates containing the highly electron withdrawing trifluoroethyl group.¹ We have also recently prepared a series of bis(trifluoroethyl)phosphonoesters *via* reaction between a nucleophilic phosphite anion and a series of α -haloesters.²

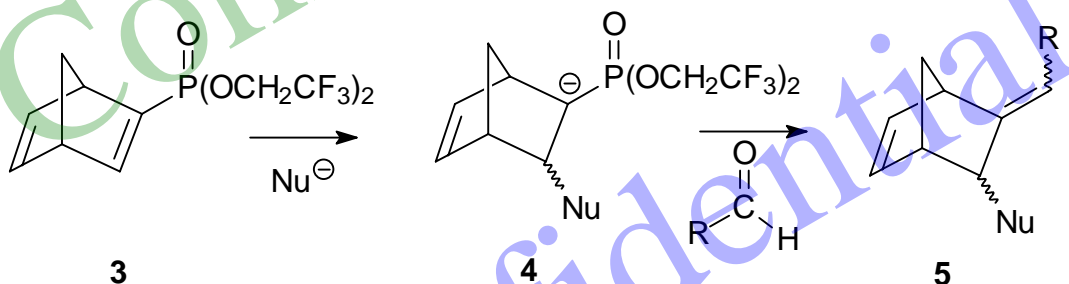
Our current efforts in the synthesis of compounds containing a carbon phosphorus bond are outline below. We are presently optimizing the isolated yields of phosphonoalkyne **2**.



Once we have sufficient quantities of compound **2**, we plan on testing its utility as a dienophile in the Diels-Alder reaction, in order to prepare bis(trifluoroethyl)vinyl phosphonates, of which compound **3** would be a representative example.



Vinyl phosphonates are good Michael acceptors, and react with a variety of nucleophiles to produce an intermediate phosphonate anion **4**, which can then undergo a Horner-Wadsworth-Emmons condensation to afford the final product **5**.



We will be able to form four new carbon-carbon bonds in a two-reaction scheme, which would be considered a rather notable and remarkable synthetic achievement. Our research plan includes variation of the dienes, nucleophiles, and aldehydes used to prepare a representative number of different carbon frameworks.

1. Bowman, R. A.; Stock, J.R.; Jackson, J.A. *Org. Prep. Proced. Int.* **9**, 31, 0.

2. Ciszewski, M.; Jackson, J.A. *Org. Prep. Proced. Int.* **9**, 31, 0.

Research Project for Prof. Sherri Evelace-Cameron:

The aim of Dr. Evelace-Cameron's projects are to answer fundamental questions about the electrochemical and chemical oxidation and reduction reactions of Cr, Mn, and Mo π -coordinated organometallic compounds. Various analytical instrumentation and vacuum line components are used in our investigations. Our overall research goals are;

1) Studying the effects of electron transfer reactions on the reactivity and bonding modes of π -coordinated ligands. 2) Synthesis of organometallic monomers, which can serve as precursors for organometallic polymers.

One class of compounds that I am studying is the synthesis of metallocenophanes. To relieve ring strain metallocenophanes may undergo ring-opening polymerization

Appropriate metallocenophanes may lead to polymeric products with intriguing electrical, magnetic or mechanical properties. In addition, structural properties may promote catalytic function in the stereoselective polymerization of olefins.

Utilize electrochemistry to probe the following questions about organometallic compounds: How does temperature affect the electrochemistry? How do solvents affect electrochemical behavior? How many electrons are transferred and is the transfer reversible? What insight does the electrochemistry data provide to explain chemical redox reactions?

A new research area for the group involves the modification of silicate surfaces with phosphonates. We will synthesize phosphonates (RPO₃) that can be attached to a silicate surface through the R- group. We will monitor the synthesis of the new silicates using NMR and obtain D-NMR upon isolation of the solid. These compounds are of interest for their application to catalysis.

Areas of research provide students the opportunity to learn air sensitive synthetic techniques and to use various analytical tools to characterize products. Examples of techniques which students would utilize are: Quality Conventional Single Crystal X-ray Diffraction Studies, Quality Conventional Powder X-ray Diffraction Studies, Merals Diffraction Studies, Cyclic voltametry, Blk electrolysis, NMR IR, and Ms Spectrometry.

Research Project for Prof. Howard D. Mee

A graduate student project is the measurement and interpretation of the high-resolution infrared spectrum of nitromethane, using the F-center laser at the University of Akron, in collaboration with Professor David Perry there. This is important because it reveals how different vibrational modes couple to each other, here with the added complication of internal rotation. The way molecules acquire and distribute vibrational energy is often critical prior to chemical reaction. There is not only some classical spectroscopy to be done with this molecule, but some further understanding of the internal dynamics will be undertaken.

An undergraduate project is to investigate how modern *ab initio* theory, in the form of the software program *Spartan* is capable of calculating equilibrium and rate constants for model compounds. The idea is to compare different basis sets, number of atomic orbitals, different methods of electron correlation and management of the solvent effect, to see how closely experiment can be approached. At the moment these methods are being incorporated in undergraduate courses elsewhere, and we need to develop that possibility here.

Research Project for Prof. James Me:

Often, chromatographic stationary phases in HPLC have been ignored as a selective component of the separation process. This is evident when it is realized that most of the workhorse stationary phases are based upon derivatives of alkyl, phenyl, amino, sulfonate, etc. functional groups. These modifications impart general, and largely non-solute specific, interactions with relatively large groups of molecules based on polarity, π - π , or charge. Increasingly, stationary phases that are somewhat specific in their ability to interact with solutes are being developed. Cyclodextrin based chiral stationary phases are good examples of such developments. The work in Dr. Me's research group, examines another type of cyclic macromolecule, namely the calixarenes, and their potential as selective stationary phases and mobile phase modifiers, whose selectivity depends upon specific types of host-guest interactions.

As demonstration of the concept that calixarenes retain their ability to form host-guest complexes when bound to silica, 4-Butylcalixarene has been covalently attached to the surface of silica using 1,1,2,2-tetramethyldichlorodisilane, a difunctional tether. The host-guest behavior of this stationary phase was probed using homologous alkylbenzenes and benzene ring compounds. Comparisons were made to a commercially available C-18 phase (Nucleosil[®]) and a 'control' stationary phase based upon 4-butylphenol, the monomer of the calixarene macrocycle. Using hydrocarbon-based stationary phases (e.g., C-18) HPLC separations of homologous series of compounds have been shown to demonstrate a linear relationship between the logarithm of the solute capacity factor (k') and the polarizability of the solutes. This is evident in the van Hoff expression governing solute retention,

$$\ln k' = \left(\frac{\Delta H}{RT} \right) - \left(\frac{\Delta S}{R} \right) \ln \Phi$$

where k' is the capacity factor, ΔH and ΔS represent the enthalpy and entropy of transfer of the solute from the mobile phase to the stationary phase, R is the gas constant, T is the absolute temperature, and Φ is the phase volume ratio ($V_{\text{stationary}}/V_{\text{mobile}}$)

For a homologous series of solutes separated under isocratic conditions (constant T) the difference in homologue retention is due only to the differences in their free energy of phase transference. For there to be a linear relationship between $\log k'$ and polarizability, the size of the partitioning interaction(s) between the solute and stationary phase must increase in a regular way with the polarizability of the solute. For a given mobile phase, the presence of any solute specific interactions with the stationary phase is discernible as a loss of the linearity of the plot.

Ultimately, the goal of this research is to synthesize calixarenes that are chiral in nature and utilize them for enantiospecific separations using HPLC and GC. Recently in this group, chiral amino acid substituted calixarenes based upon were synthesized and characterized.

Preliminary testing was conducted utilizing a phenylalanine-derived 4-butylcalixarene as a GC stationary phase and serine-derived 4-butylcalixarene as a mobile phase additive.

Although host-guest formation could be demonstrated, the phenylalanine derivative did not demonstrate enantioselectivity under the chosen GC test conditions; further work must be done to examine other test conditions, as well as methods for immobilization of the chiral calixarene in the GC column. The serine derivative utilized as a mobile phase additive appeared to be able to resolve several enantiomers; further work must be done here as well to examine other separation conditions and to ensure that the observation was not a fluke. In addition, students may work on synthesis of new types of chiral calixarenes, as well as synthesis and characterization of calixarene based GC and HPLC stationary phases.

Research Project for Prof. Daryl Macey:

Three projects of interest are: 1) The elements K, Na, Ca, Sr, I, Fe, Mn, Co, Cr, Pb, Zn, Cu, Ni, B, Se, and possibly others will be determined in the larval stage of approximately twenty species of Lepidoptera, a group of indigenous northeastern Ohio moths. The total number of samples is about 300 and include larvae, food (leaves) feces, and leaf residuals. Dr. Lauren Schroeder, Emeritus Professor of Biology, has collected these samples over the past thirty years. The time dependent changes in element concentrations will be of general scientific interest to see if the levels of biologically detrimental elements have fallen since the closing of area steel mills and other metal manufacturing plants. In addition, through a mass balance of elements in laboratory specimens their food, residuals, and feces the rate of ingestion of larvae in the wild can be determined. This is a value not directly obtainable in the wild and is needed to attribute changes in environment to biological changes in the larvae; 2) The Monong River which flows through Youngstown has been ranked by the U.S. EPA as one of the 'most polluted' waterways in the country. In the late sixties there were fifteen major steel mills, various support facilities, and seven coke manufacturers. The river sediment is extremely high in heavy metals and various organic pollutants. The Army Corps of Engineers is preparing to investigate the best remediation protocol for treating and/or removing the sediment. Sediment cores from 0.2 meters in lengths have been partitioned into 1-5 cm sections. Cores have been taken at four locations from shore, at four locations behind each of nine low head dams. A total of about 160 samples are waiting for analysis. Heavy metals and other environmentally significant elements will be determined; 3) In addition, the levels of heavy metals and their chemical speciation will be determined in soil, air, and water samples in and adjacent to Brownfield sites, including those that line the Monong River.

Research Project for Prof. Peter Norris:

Since arriving at YSU in the Fall of 1996 we have been developing several projects in the area of heterocyclic chemistry with an emphasis on synthetic carbohydrate chemistry. The group has involved some 25 and 35 students who have come primarily from chemistry or biology backgrounds, all of who have interests in chemistry as it relates to biological problems.

Projects since 1990 have included a polymer-supported method for the synthesis of triazole heterocycles that involved several students, the results of which have been presented at regional American Chemical Society meetings as well as in two published papers. With funding from the ACS Petroleum Research Fund we have investigated the use of bis(sulfones) in the formation of new C-glycosides. This project has involved extensive collaboration with Tim Wyrner in the area of X-ray crystallography and has again resulted in presentations and published articles.

Of most recent interest has been the synthesis of more complex C-disaccharides by using new dithiane chemistry. We have been able to prepare carbohydrate-derived dithiane nucleophiles, which add to sugar-derived lactones selectively to generate *trans*-substituted products. Efforts are currently focusing on reduction of these compounds to yield potentially biologically active C-disaccharides. A more recent direction within the group, which again involves undergraduate students, is the chemical synthesis of aminosugars that are found in the capsular polysaccharide of the bacterium *Staphylococcus aureus*. In collaboration with biochemist Dr. Jeff Smiley and microbiologist Dr. Diana Fagan of YSU we are developing syntheses of glycomimetics that may be capable of acting as antibiotics for the treatment of *S. aureus* infections. This particular project, which has gained financial backing from YSU, represents an excellent possibility for our undergraduate students in that it is truly at the interface between chemistry and biology, and will allow students to experience techniques and concepts over a broad range of disciplines.

Research Project for Prof. Me Serra:

Molecular oxygen, O_2 is kinetically unreactive but partial reduction generates a family of reactive compounds collectively known as reactive oxygen species (ROS). ROS include free radicals such as superoxide ($O_2^{\cdot-}$) and the hydroxyl radical (HO^{\cdot}) as well as non-radicals such as singlet oxygen and hydrogen peroxide (H_2O_2). The most reactive species by far is the hydroxyl radical (HO^{\cdot}). HO^{\cdot} reacts at essentially diffusion controlled rates causing oxidative damage to all types of biomolecules.

ROS naturally arise from a variety of sources including exposure to X-ray and ultraviolet radiation, the action of oxidase enzymes, and enzymes involved in detoxification. By far, however, the greatest source of ROS arises from the reaction of transition metal ions such as copper (Cu) and iron (Fe) with endogenously produced H_2O_2 . Metal ions reduce H_2O_2 to the hydroxyl ion (OH^-) and HO^{\cdot} .

To prevent the formation of ROS a number of antioxidant defense mechanisms have evolved. For example, under normal physiological conditions metal ions are tightly sequestered by specific metal ion binding proteins. However, with increases in age, diabetes, during periods of ischemia or during oxidative stress the plasma concentration of the transition metal ions of copper and iron increases. These free metal ions either precipitate out of solution or bind to available biomolecules. Reaction of the bound metal ion with H_2O_2 leads to the production of HO^{\cdot} that reacts in the immediate vicinity of its site of production. Such damage has been referred to as site-specific. Site-specific damage to proteins is characterized by the following features: (a) one or at most a few amino acid residues are modified, (b) oxidative damage is insensitive to the presence of free radical scavengers suggesting that damage is caused by radicals produced at the protein's surface and not in the bulk solution, and (c) most of the enzymes that are sensitive to metal ions and H_2O_2 require metal ions for activity.

Generally ROS generation and antioxidant defense mechanisms are in balance. In cases such as ischemia-reperfusion the balance is tipped in favor of ROS resulting in oxidative damage to all types of biomolecules. Since one enzyme can catalyze thousands of reactions, oxidative damage to these molecules can be particularly toxic. Such damage includes the formation of protein carbonyls, the modification of amino acid residues, covalent cross-linking, and fragmentation of the polypeptide chain.

My research uses metal catalyzed oxidation (MO) systems to study oxidative damage to a model protein. MO systems utilize O_2 or H_2O_2 , and often some type of reducing agent and

are capable of producing HO[•]. These systems mimic the process of oxidation that occurs during periods of oxidative stress or during ischemia-reperfusion. Over forty proteins have been studied using MO systems. To better understand what makes a protein sensitive to oxidative damage by metal ions and H₂O₂ more proteins need to be studied. Some researchers argue that site-specific damage is a caged-reaction in which the metal ion binds in a pocket found along the protein's surface. The pocket provides a protective environment for the production of ROS preventing them from being scavenged by antioxidant defense mechanisms. Other evidence suggests that the sequence of the protein is more important in determining site-specific damage. It is known, for example, that the amino acid histidine binds copper tightly. It might be expected, therefore, that oxidative damage would occur more frequently around histidine residues in a protein. I wish to determine whether primary sequence or three-dimensional structure is more important in the oxidative damage of proteins by MO systems.

Research Project for Prof. Jeffrey Smiley:

Several of the projects of current interest to our research group include:

- 1) Provide evidence for the ODCase catalytic mechanism involving contact between the Lys9 amino group and O2 of the substrate by examining the Raman spectroscopic profile of ODCase in complex with inhibitors. These inhibitors will have substituents at C6 that are roughly isosteric with the substrate carboxylate, so that the possibility of binding of the inhibitor pyrimidine ring rotated 180° from that of the substrate will be minimized;
- 2) Provide evidence for the ODCase catalytic mechanism involving contact between the Lys9 amino group and O2 of the substrate by examining the ¹H NMR spectra of an engineered ODCase with ¹⁵N specifically placed at the Lys9 amino group. We have identified ¹H signals in ODCase/inhibitor complexes that are not present in the spectrum of ODCase alone. These signals may represent the amino protons on Lys9. Using the specifically-labeled engineered version of ODCase, the ¹H signals from Lys9 will be split into doublets, and may be identifiable in the spectra. Again, we will use inhibitors with substituents at C6 that are roughly isosteric with the substrate carboxylate;
- 3) Provide evidence for the ODCase catalytic mechanism involving contact between the Lys9 amino group and O2 of the substrate by examining the ¹⁵N NMR spectrum of [¹⁵N, ¹³C]labeled inhibitors in complex with ODCase. With ¹⁵N1, ¹³C1, ¹H1' within the nucleotide inhibitor, triple-resonance NMR can be used to gain information on the protonation state of the bound inhibitor. If the ODCase mechanism proceeds through protonation at O2 inhibitors bound to the active site may be stably protonated;
- 4) Develop purification methods for IDCase based on its strong inhibition by 5-nitouracil. We have observed that a preliminary level of purification can be achieved using affinity chromatography with immobilized 5-nitouracil under conventional low-pressure chromatography conditions. We expect that optimization of the chromatography conditions using high performance chromatography will produce excellent results, possibly sufficient for identifying IDCase as a predominant band in polyacrylamide gel electrophoresis;
- 5) Obtain initial enzymatic characterization of IDCase, including its interaction with fluorinated pyrimidines such as 5-fluorouracil, which is expected to be significant considering the anticipated enzymatic mechanism;
- 6) Obtain amino acid sequencing of the purified IDCase, design a degenerate oligonucleotide probe based on the amino acid sequence, and screen for the IDCase gene in a cDNA library of *R. glutinis* genes.

Research Project for Prof. Jim Wagner

One relatively new area of research in Dr. Wagner's group involves the synthesis and structural characterizations of a series of inorganic nitride-fluoride compounds derived from well-known oxides in the rock salt and perovskite systems. Here, the composition of the nitride-fluoride analog is obtained by replacing two O²⁻ ions of the metal oxide with a (NF)⁴⁻ group. This is an area of inorganic solid state chemistry which has been largely neglected, as evidenced by the fact that less than forty such nitride-fluoride compounds have been reported in the literature, as compared to tens of thousands of inorganic oxides, nitrides, and fluorides. The research focuses on the preparation of both powder and single crystalline samples, followed by structural characterization using X-ray diffraction techniques. Undergraduate student participants do all of

the synthesis work in these projects, and also have hands-on access to the X-ray equipment. For those wishing in-depth exposure to X-ray diffraction techniques, we offer a concentrated lecture-laboratory course in X-ray crystallography each Spring.

For the single crystalline studies, we are currently focusing on the synthesis of samples of nitride-fluorides derived from M compositions, e.g. Ca_2NF , Sr_2NF , Ba_2NF , and others. Recently, we have successfully prepared single crystalline samples of Ca_2NF , and completed its X-ray structural characterization. No single-crystalline structure characterizations of any inorganic nitride-fluoride compound have previously been reported, probably in part due to the difficulty in working with these highly air-sensitive compounds. Thus the reaction preparation, as well as mounting of the final crystalline products for X-ray analysis, must be done in a glovebag under inert atmosphere. Interestingly, students working on this project seem to enjoy the challenge. Currently one undergraduate student is working in this area, specifically on the preparation of single crystalline Ba_2NF .

The main focus in the powder aspects of the study at present is the preparation of a nitride-fluoride analog of a ternary oxide, particularly perovskite, CaTiO_3 . Perovskite-type compounds have been widely studied in recent years, due to their relationship to the structure of high temperature superconducting oxides. Our approach is to model the entire oxide reaction, as opposed to doing a direct synthesis between binary nitrides and fluorides. This approach requires the preparation of nitride-fluoride precursors as a first step:



Currently, we are optimizing the preparation of bulk quantities of pure Ca_2NF powder, and are working on the preparation of TiNF (which has been done previously). Once the precursors are prepared, we will attempt to prepare $\text{CaTi(NF)}_{1.5}$ using standard ceramic methods. If successful, this will be the first nitride-fluoride analog of a ternary oxide compound reported. This project is currently supported by a Research Corporation Grant. It has attracted a high level of involvement of undergraduate researchers, and could certainly benefit from increased involvement. As so few inorganic nitride-fluoride compounds have been prepared and studied

Post-Project Activities:

All student and faculty supported by this REU will be asked to provide a copy of their notebook, poster, research proposal, and a final written description of their summer effort. In addition, an assessment instrument will be prepared to assist in evaluating the effectiveness of the program. Participants will be tracked to discern the choices they make after graduation. Any publications resulting from their work initiated at YSU will be collected. Students will be encouraged to present their work in a seminar at their four-year college and these assessment materials and the student results will be copied to their four-year college mentor.

Student Travel Fund

A sum of \$0 will be made available to each student for presenting their work at an appropriate regional or national meeting. Airfare, hotel accommodations, mileage, and meals are all expenses that will be supported. Application for travel reimbursement will be made on a YSU Student Travel Request Form. Presenting one's results in a scientific forum is an activity that must be strongly encouraged.

The Research Environment:

YSU is an urban public institution located in downtown Youngstown, OH, an industrial center situated midway between Cleveland, OH and Pittsburgh, PA. YSU is a mid-sized, predominantly undergraduate institution, with M programs in the majority of sciences and engineering disciplines. Through two early retirement incentive plans, the University has replaced about one-third of its 00 full-time faculty over the last seven years as well as all of its upper administration. This has produced a climate for progress that is refreshing for the faculty.

The main mission of the Institution is to become a Premier Metropolitan Institution.” Recently it has made tremendous strides toward reaching its goal.

The student population of YSU is approximately 12000, with a composition of 5% female, 9% underrepresented minorities, and 50% non-traditional. Recruitment efforts for both students and faculty focus on underrepresented minorities, with particular emphasis placed on retention of minority students beyond the freshman year. YSU is actively involved with the local public school systems in Youngstown and Wren, Ohio (which have substantial African-American enrollments) to encourage through grants and scholarships, attendance at YSU.

The fifteen faculty that comprise the Department of Chemistry at Youngstown State University are committed to a systemic change in the way they approach chemistry education at all levels ranging from outreach efforts to the community, including K-12 students, as well as instructing future K-12 teachers and providing support for present ones, to introduce chemistry to college students of diverse backgrounds (including non-majors, undergraduate majors and M.S. students.) The faculty see the FY001 conversion from a quarter system to semesters as an opportunity to examine its present curriculum and, in light of innovative teaching/learning strategies that have been shown by assessment strategies to work, improve it. Various faculty have engaged in efforts directed at specific targeted groups among those described above. These efforts have been supported at the institutional, local, state, and national levels. Although each individual effort may appear distinct, they are integrated and will lead to a systemic change as they are based on the same goals and objectives.

The faculty at YSU have as its first goal achieving the highest quality in teaching, scholarship, research and public service. YSU actively seeks faculty able to combine these talents in ways that bring excitement to the classroom, and stimulate enthusiasm and eagerness for learning among students. The faculty is active at all levels of undergraduate education, and students are provided with the opportunity to receive small-group team-oriented instruction that effectively matches the level of preparation with the abilities of the student. This unique approach to higher learning is evidenced by a four to six semester hour course dealing with topics relevant to conducting research in Chemistry which is required beginning in FY 0001. This capstone experience for undergraduates will culminate in a thesis (B students) or productivity report (B students) that will be reviewed and evaluated by a faculty advisor and other faculty members. Comparable capstone experiences exist at very few other open enrollment institutions in the country and yet the results attainable from such a curriculum are described by national organizations as being a real improvement in undergraduate education. Several references that detail the state of undergraduate research in the country include: The Carnegie Foundation for the Advancement of Teaching: The Byer Commission on Educating Undergraduates in Research Universities Report, Reinventing Undergraduate Education: A Blueprint for America's Research Universities;¹ Government-University-Industry Research Roundtable: "19 Report"² and Stresses on Research and Education at Colleges and Universities;³ Project Hindsight: Undergraduate Research;⁴ National Science Foundation: Shaping the Future: Volume II Review Disciplinary Perspectives, Drs. Eliel and Stacy;⁵ National Center for Undergraduate Research: "Incy Program Announcement";⁶ and others. These have assessments that clearly indicate the benefits of active, hands-on, group-centered, realistic problem-based learning. The primary mission of YSU is to integrate teaching, scholarship, and service and the adaptation and implementation proposed are well suited to this end. The personal experiences that chemistry faculty have had in collaborative efforts with Biological Sciences, Environmental Studies, Geology, Physics, and other departments at YSU as well as K-12 educators and administrators and local community leaders also indicate that the changes proposed will better serve the undergraduate student.

Ca. Results from Prior NSF Support : Since 1990 The National Science Foundation has supported the Principal Investigators, PI, and their colleagues at Youngstown State University (YSU) through sixteen undergraduate education awards.⁷² A diverse number of departments, faculty, and programs were involved: Biology, Chemistry, Civil and Environmental Engineering,

Engineering Technology, Environmental Studies, Biology, Mathematics and Statistics, and Physics. The effect that this concentrated NSF DUE support (the national average is four per institution over ten years) has had throughout YSU is dramatic. In 1998 NSF commissioned a review of the IL program, the authors observed that this is typically the result at "rich" institutions (ten or more IICCL grants over a ten-year period) ³ Not only have YSU students gained expanded post-baccalaureate educational and employment opportunities, but there has also been a synergistic, campus-wide effect that surpasses the impacts of individual projects." ³ In several instances, such as in Chemistry and Environmental Studies, complete curriculum reforms have stemmed from IICCL grant proposals. Opportunities for undergraduate student research have become the standard. ³ In the case of Chemistry, the most significant change is a capstone thesis project required (of all majors) with original research and written and oral presentations, comprising a large portion of the senior year curriculum. The IICCL grants have become a seed that initiated a climate of proposal writing collaboration" ³ with other interdisciplinary and multi-disciplinary grants [instructional and research] to national and state agencies and organizations. This climate of collaboration has not only involved various departments and programs within the institution, but also among members of the PPA and YSU.

The PPA comprises over 100 ~~SMK~~ faculty members and over 400 ~~SMK~~ students graduating yearly. Strategies and protocols for the remote operation of YSU instrumentation, and the transmission of results via the INTERNET, are being developed. Students and faculty from nearby PPA schools have used YSU's 40 ~~Mz~~ NRI X-ray Diffractometers, G and C-mass spectrometers, and elemental analysis instrumentation (AA and ICPAES) ~~Virtual~~ access of this state-of-the-art instrumentation by PPA faculty and students will result in increased educational and research activities.

Of these fourteen NSF IICCL grants, the ones most relevant to this proposal are:

NSF-DUE-1 "Environmental Science: A Multi-Discipline Approach," \$100,000, (1999) S. Martin (Civil and Environmental Engineering), D. Macey (Chemistry) and L. Schroeder (Biology) developed the instrumentation courses, ENST 3 and 2 for environmental-studies students. This initial project led to the full development of the Environmental Studies Program at YSU. Two Research Challenge Grants supported by the Ohio Board of Regents, OBR, \$6,000, to study the water quality of the Monong River and its tributaries, and an Ohio Department of Development Grant, \$1,000, to assess and evaluate the reuse of Brownfields' industrial sites along the river, resulted from this cooperative effort.

NSF-DUE-2 "An Investigative Science Laboratory," \$30,000, (1999) Schroeder, D. Macey, S. Martin, and J. Dick (Biology) has supplied equipment for Environmental Studies ENST, 61L and 62L Fundamentals of Environmental Studies Laboratory 1 and 2. In these labs, creative thinking and problem solving skills are facilitated through investigative-type experiments performed by teams of students in a guided-inquiry approach to collaborative learning. The lab course has been offered biannually since the spring of 1998 and covers fundamental issues in environmental studies including basic ecology, biodiversity, global warming, acid rain precipitation, toxins, energy production, air, water, and soil pollution. There are currently over 100 Environmental Studies majors.

NSF-DUE-3 "Brownfields Investigations as an Integrated Approach to Sampling, Sample Preparation, and Analysis," \$30,000 (1999) D. Macey, S. Martin, R. Falconer (Chemistry) and Dick, has resulted in the updating of the environmental studies instrumentation courses, ENST 3 and 2. The funding was used to create an extensive, team-taught laboratory and integrated field study course where small groups learn, in a more open-ended and cooperative style, the analytical methods used in performing real-life Brownfields investigations. It is intended to be the logical step after ENST 61L and 62L permitting the students more control in the type of samples collected and the type of protocols and instrumentation utilized for the analysis. Forty-one students, primarily Environmental Studies majors, took the course during 1999. Real-life problem-solving nature, "group-learning laboratory experience," "a sense of relevance," and "a greater involvement in the experience"

were responses given by students as reasons that the course seemed more meaningful to them. Several students will be utilizing their experience this summer as they assist in another state-funded multi-million dollar study of Brownfields located in communities along the Monong River, including Youngstown. Also, thirty-two PPA students have used the microwave oven digestion system, graphite furnace atomic absorption spectrometer, and GM to gather data on environmental samples they had collected as part of courses at their individual institutions. Samples analyzed were acquired from soils and waters near, if not, on Brownfields property. This equipment was not available to these students at their own institutions. As with all YSU instrumentation, there was no charge for its use and the PI, other faculty, students, and staff assisted faculty and students from other schools.

SF-DUE-L Integration of Automated GM Into the Undergraduate Curriculum, J.A. Jackson, A. D. Hunter, R. LFalconer, T. R. Wgner, and S. MSchildcrout. This project obtains a robotic sample changer controlled GM facility directed toward undergraduate education and student research courses. The robotic sample changer controlled GM enables unattended data collection on student samples overnight and on weekends. The GMs being networked to a series of existing data stations, allowing student data processing, analysis, and use in lecture courses. The GM results are being integrated with the results from other spectroscopic (especially multinuclear NMR) and crystallographic techniques. Laboratory studies in the sophomore through senior years emphasize hands-on, research-based laboratory experiences. Ms spectra and G data is being made available to other users via the Internet, in combination with NMR data for the same compound. Summer courses on advanced instrumentation operation and data analysis techniques are being offered to college faculty.

SF-DUE-L Integration of Quantitative Materials Characterization Throughout Chemistry & Physics Curricula, (S, (2001) A. Hunter (Chemistry) S. Bower (Physics and Astronomy) T. Kn (Chemistry) D. Macey, and T. Wgner (Chemistry) funded the purchase of Thermal Analysis, Mcometry, & CI Permeation Chromatography Equipment. This instrumentation has been used in several chemistry and physics courses. Of particular note is the impact it has had on materials science program at YSU, which was in decline but has been revitalized with the cooperation of engineering, physics, and chemistry. Undergraduates have participated in these grant efforts, presented their work at national conferences, co-authored articles in peer reviewed journals, and are now successfully employed in chemical, environmental, pharmaceutical, and related fields.

C1. Educational Outcomes of These and Related Grants: At YSU and the collaborating PPA institutions, these and similar projects have been assessed and shown to have positive student outcomes.²⁶ They have enabled the conversion of many lab courses away from the conventional skills oriented/verification model to discovery experiences. The revised curricula are based on current knowledge of how students best learn are consistent with recent recommendations for change in how science is taught.²⁸ As illustrated by the list of collaborators in the previous grant proposals, close work with colleagues in Biology, Ecology, Environmental Studies, Physics and Astronomy, and Engineering is actively sought and has been to the benefit of faculty, students, and academe. Of particular note is the use of instrumentation, often acquired under IICCL proposals to enhance the research activities of the faculty and students from YSU and affiliated institutions. Increases in publication rates and research grant seeking are direct results of these initial NSF support grants. Publications resulting from these grants and those involving students are listed in the biographical sketches.

C2. Goals and Objectives: This proposal will address the need for students to learn techniques and analytical instrumental methods needed by graduates but not easily learned in conventional lecture/laboratory courses. The current literature on SEM educational needs is quite homogeneous in their analysis of the problems facing undergraduate students and their recommendations for change.²⁹ All have passages very similar to the following statement of goals: that all students at all levels will be exposed to programs with high standards for understanding and accomplishment; that all students have the opportunity to advance to higher

levels; that all students who enter advanced training at the professional level are well and broadly trained; and that the process of learning does not end with the classroom.”⁹

For SRE faculty, one recommendation is that they should build into every course inquiry, the processes of science . . . a knowledge of what SRE practitioners do, and the excitement of cutting edge research”and also devise and use pedagogy that develops skills for communication, teamwork, critical thinking, and lifelong learning in each student.”¹ These recommendations are in stark contrast to the present description of SRE education. The purely lecture format does not invigorate students.⁸ Creative thinking, problem solving, writing and communication skills and team work are not stressed. The educational experience tends to be inflexible and is not tailored to the learner, but instead promotes the same courses for everyone. Faculty do not appear to be approachable. Hands-on”experiences are lacking. Technology is not an integral part of the learning process. Techniques taught in schools are out-dated relative to the ones expected by employers, making the transition to work difficult. There exists a lack of industry involvement in the educational process also making the transition to work challenging. There is a lack of role models for women and minorities and students termed underserved and underrepresented have too many obstacles in their way to succeed.

Simply stated, the goals and objectives of faculty and staff at YSU are to correct these problems by forming research-learning communities”within and across disciplines, physical buildings, and institutions to effect truly systemic changes.⁹ The institution is very much aware of the need for students to have experience with protocols and instrumentation as close as possible to that used in industry or research”institutions. In the past ten years, YSU has either provided matching funds for, or purchased outright, instrumentation with a value approaching three million dollars. Employers specifically told several students that they had been hired because of their undergraduate research experience with real-life”instrumentation. The X-ray diffractometers, GM and 90 MHz NMR were specifically mentioned.

One difficulty faced is that although PUIs have a strong commitment to undergraduate education and have typically been early adopters of curriculum innovations such as research-like, real-life experiences,^{4,2} collaborative learning strategies,³⁴ and writing across the curriculum,³⁵ approaches that require specialized instrumentation, even if important or even fundamental to the discipline, have been implemented more slowly at PUIs. Even if PUIs are able to obtain the required capital funding, their limited operating budgets and technical support make instrumentation maintenance challenging.³³ This statement is particularly poignant for those disciplines that are increasingly relying on instrumentation in the real-world”but do not have the tradition, which translates into budgets and staff, to support them in academic settings.

Instrument Access and Educational Effectiveness: For the above reasons, PUI students and faculty from traditional and non-traditional disciplines often forego such hands-on research experiences and resort to dry”or virtual”labs. If equipment is available, it is often out-dated, non-computerized, and certainly not state-of-the-art, which diminishes the overall effectiveness of the experience. If a regional research institute is close, only infrequent trips to have demonstrations may substitute for hands-on experiences. Even in favorable cases, access to instrumental analysis experiences is either too expensive and/or inconvenient for meaningful routine use and/or it is difficult to get sufficient timely instrument access due to the busy instrumentation schedules at research”institutions.³⁶

It is proposed that the impact of research requiring instrumental methods on student learning is most effective at moderate-size institutions, often where the master’s degree is the highest degree offered and the integration of teaching and research is stressed. For this proposal, the chemistry department is most capable of providing an effective experience for students needing instrumentation located either within the institution or nearby. Such access will heighten student understanding of what would otherwise be theoretical”precepts as well as hone research skills, techniques and concepts.

CB Expected Project Outcomes: At the completion of this project, each student and faculty with their own unique experiences, from within the institution and among the PPA, will

be enriched by having the hands-on experience of using instrumentation in research settings. Faculty and students will improve their credentials along with those of their institutions with presentations and publications at and in national forums.

C3 Student Recruitment and Selection: Recruitment efforts will be directed towards students and faculty from the Public Private Alliance. Since these participants are in YSU's region, it is expected that co-operations formed during the summer will continue throughout the year. Including the faculty from the PPA institutions, a continuity of projects will exist even after the student participants have graduated. New students entering these colleges will benefit from these initial research efforts. The chemistry department chairs will be contacted. The chair will be requested to distribute REU announcements to their faculty and students. At least one member from this proposal will travel to the four-year school to present a seminar or a guest lecture. During this trip, the REU program and possible research projects will be described. Announcement will also be e-mailed to the faculty at the four-year schools. An application will be available during the visits and on the YSU chemistry web site, and copies will be mailed upon request. Each application packet will include a description of the REU program, a brief description of the department of chemistry at YSU, a description of available projects, and an application form. Members of groups that are termed underrepresented and underserved will be encouraged to apply. A complete application will include a completed form, a copy of the student's transcripts, two letters of reference from the applicant's faculty, and a one-page personal statement regarding the student's experience with, and interests in, research. Included will be a description of their future education and career plans and how they feel the REU experience will facilitate their plans. Dissemination of this information will occur in early January. The deadline for application will be March 1, 2001.

A committee of a least four participating faculty (two from YSU and two from the PPA) and the PI will select those attending the program. One of the major goals of the Department is to develop the skills of those B and B graduates that would be termed "second tier" to a level that permits them the opportunity to compete at Ph.D. institutions. The department has been quite successful in achieving this goal. We would like to have approximately one half of the successful applicants to be those that would be identified as "second tier" undergraduates. We feel that such an intensive summer research program could benefit domestic students who otherwise would not have the credentials for entry into a graduate program. Such qualities as enthusiasm, creativity, and diversity may compensate for a less than stellar GPA. Notification of awards will be by March 15, 2001.

C4 Project Evaluation: Materials described above will be reviewed by members of the Youngstown State University Center for Education Research, directed by Dr. Stacey Lowery Bretz. Through both formative and summative measures, members of the center will evaluate the central goal of this project: assess both access to and enrichment of the undergraduate student. Through both qualitative and quantitative measures, they will assess the degree of success with respect to the expected project outcomes identified above (i.e., the impacts of this project on faculty research efforts, changes in students' attitudes and goals, changes in the content and structure of student learning, and in faculty grant activity and student research output at both YSU and other PPA schools). This information will be collected from both embedded and single purpose assessment instruments including structured faculty and student interviews and surveys and student work products. The quantitative measures will assess the magnitude of this project's success while the qualitative pieces will document the all-important context (i.e., the how's and why's so critical to successful dissemination and further adaptation). All YSU or PPA faculty and students who have participated in the project will be surveyed. Employers of, and graduate schools accepting, our graduates and those of allied institutions will also be surveyed for feedback on the competence of alumni of this program.

Section D: References Cited

1. The Carnegie Foundation for the Advancement of Teaching, "The Byer Commission on Educating Undergraduates in Research Universities Report 'Reinventing Undergraduate Education: A Blueprint for America's Research Universities'" .
2. University-Industry Research Roundtable: " Report," .
3. University-Industry Research Roundtable: " Stresses on Research and Education at Colleges and Universities " .
4. Project Kaleidoscope, " Learning Science: Undergraduate Research " ; <http://www.pkal.org/work/undergrad.html> , .
5. National Science Foundation, " Shaping the Future: Review of Disciplinary Perspectives " , Drs. Eliel and Stacy," .
6. National Center for Undergraduate Research, " Faculty Program Announcement," 19 .
7. Environmental Science: A Multi-Disciplinary Approach. Overview : 98, Youngstown State University, YSU, Scott Martin, Undergraduate Instrumentation and Laboratory Improvement Program-INSTRUMENTATION & IMPROVEMENT .
8. Automated Data Acquisition and Control of AC and DC Machines Laboratory. Overview : 99 YSU, Theodore Sela , Undergraduate Instrumentation and Laboratory Improvement Program-INSTRUMENTATION & IMPROVEMENT .
9. Developing an Instructional Optical Disc Production Laboratory for Industrial and Civil Engineering. Overview : 96 YSU, Hojjat Miri, Undergraduate Instrumentation and Laboratory Improvement Program-INSTRUMENTATION & IMPROVEMENT .
10. Subsurface Investigations: An Integration of Geological Principles . Overview : 98, YSU, Jeffrey Dick, Undergraduate Instrumentation and Laboratory Improvement Program-INSTRUMENTATION & IMPROVEMENT .
11. Integration of Automated G-M into the Undergraduate Curriculum . Overview : 98 YSU, John Jackson, Undergraduate Instrumentation and Laboratory Improvement Program-INSTRUMENTATION & IMPROVEMENT .
12. An Investigative Science Laboratory . Overview : 99 YSU, Alan Jacobs, Undergraduate Instrumentation and Laboratory Improvement Program-INSTRUMENTATION & IMPROVEMENT .
13. Restructuring the Physics Lab: A Remote Interactive Approach . Overview : 99 YSU, William Sturris, Undergraduate Instrumentation and Laboratory Improvement Program-INSTRUMENTATION & IMPROVEMENT .

- 14 Modernization of Instrumentation in a Physical Measurements Course . Overview :92
YSU, Francis Kygowski, Undergraduate Instrumentation and Laboratory Improvement
Program-INSTRUMENTATION & IMPROVEMENT.
- 15 Downfields Investigations as an Integrated Approach to Sampling, Sample Preparation, and
Analysis. Overview :915, YSU , Daryl Macey, Undergraduate Instrumentation and
Laboratory Improvement Program-INSTRUMENTATION & IMPROVEMENT.
- 16 Enhancing Undergraduate Education through Mossbauer Spectroscopy . Overview :
93 YSU, James Carroll , Undergraduate Instrumentation and Laboratory Improvement
Program-INSTRUMENTATION & IMPROVEMENT.
- 17 A Computer Laboratory for Mathematics Instruction . Overview :907 YSU, John
Boni, Undergraduate Instrumentation and Laboratory Improvement Program-
INSTRUMENTATION & IMPROVEMENT.
- 18 Investigative Approaches in the Natural Sciences . Overview :909 YSU, John Usis,
Due Course and Curriculum Program-INSTITUTION-IDE REFORM AND
Updated 10/21/05 PM
- 19 Integration of Quantitative Materials Characterization Throughout Chemistry & Physics
Curricula, Purchase of Thermal Analysis, Microscopy, & Permeation Chromatography
Equipment . Overview :9107 YSU, Allen Hunter, Undergraduate Instrumentation and
Laboratory Improvement Program-INSTRUMENTATION & IMPROVEMENT.
- 20 X-Ray Diffraction Analysis Throughout the Curriculum: a Powerful Tool for Understanding
Molecular Structure and Bonding . Overview :92, YSU, Allen Hunter, Course,
Curriculum, and Laboratory Improvement Program-Educational Materials Development-
CCLEUCATION AND MATERIALS DEVELOPMENT.
- 21 Integration of Computer Technology into the General Chemistry Curriculum . Overview :
900, YSU, Timothy Wagner, Course, Curriculum, and Laboratory Improvement
Program-Adaptation and Implementation-CCLADAPTATION AND
IMPLEMENTATION.
- 22 CSEM Technology Leaders Scholarship Program . Overview :98, YSU, James Mc,
Computer Science, Engineering and Mathematics Scholarships-CS, ENCMTH
SCHOLARSHIPS.
- 23 Tuss, P., Frechtling, J, and Ewing, T., 'A Report on an Evaluation of the National Science
Foundation's Instrument and Laboratory Improvement Program,' Watat, Inc.,
<http://www.nsf.gov/pubs/1998/i-toc.htm>, 9 .
- 24 Betz, S. L. Evaluation: An Introduction to Why and How, 'CHED Newsletter, American
Chemical Society Division of Chemical Education, 9 , 810.

- 2 Dreisbach, J.H., Hogan, T.P., Stamford, A., McGee, J.W. Focus Groups and Exit Interviews are Components of Chemistry Department Program Assessment, *J Chem. Educ.*, **9**, 310.
- 3 Robinson, W.R., A View from the Science Education Research Literature: Concept Map Assessment of Classroom Learning, *J Chem. Educ.* **9**, 119
- 2 Hazen, Mirefil, J, *Science Matters: Achieving Scientific Literacy*, Doubleday, New York, 1991.
- 3 Heller, P., Keith, R., Anderson, S., Teaching Problem Solving Through Cooperative Grouping, *Am. J Phys.*, **9**, 6, 26
- 2 National Academy of Science, “ *National Science Education Standards* ”, <http://books.nap.edu/html/nses/html3.html>, 1996.
6. Freeman, R.G. “ *PKI Faculty 2 Profiles* ”, <http://pkal.org/2stcent/class/freeman.html>, 1999.
3. Ycan, D.E., “ *PKI Faculty 2 Profiles* ”, <http://pkal.org/2stcent/class/ycan.html>, 1999.
- 2 Lewis, T.L., “ *PKI Faculty 2 Perspectives* ”, *PKI Faculty 2 Profiles*, <http://pkal.org/2stcent/class/lewis/student.html>, 1999.
- 3 The Pew Science Program in Undergraduate Education, “ *Policy Perspectives*,” *M. 8* Number 1, 1999.
- 3 The American Chemical Society Committee on Professional Training (CPT), “*Undergraduate Professional Education in Chemistry: Guidelines and Evaluation Procedures*,” <http://www.acs.org/cptguide.htm>, 1999.
- 3 National Science Foundation, “ *Shaping the Future Conference: Focusing National Interest on Undergraduate Education* ”, 1999.
- 3 National Science Foundation, “ *Shaping the Future: Expectations for Undergraduate Education* ”, 1999.
- 3 National Science Foundation, “ *Shaping the Future: Volume II Perspectives on Undergraduate Education* ”, 1999.
- 8 National Science Foundation, “ *NSF in a Changing World, NSF 99-2* ”, *Restated on the cover page of Shaping the Future: Expectations for Undergraduate Education in Science, Mathematics, Engineering, and Technology* ”, NSF 99-2 (1999).
- 9 National Science Foundation, “ *Recent Graduate Focus Groups Summary* ”, from the EHR Review, <http://www.ehr.nsf.gov/ehrDUE/documents/reviewfocusgraduate.html>, 1999.

0. The American Chemical Society Committee on Professional Training (CPT) "What to look for in Your Undergraduate Education" 1997.
4. "System Changes in the Undergraduate Chemistry Curriculum: Adapt and Adopt CCL-A" ; <http://www.ehr.nsf.gov/EHRDUEawards/ccdchemcheminit.htm>, 1997.
- 2 Schildcrout, S. M. "Carbocation-Ion Fragmentation Mechanisms in Chlorobenzenes by GPC and GPC-MS: A Physical Chemistry Approach for Undergraduates," J Chem. Educ. 70, 761-62.
- 3 Kara, C. "A New Investigative Sophomore Organic Laboratory Involving Individual Research Projects," J Chem. Educ., 74, 79.
- 4 Parker, O. J., Beneman, G., Tunheim, J.A., "Improving Science Instruction: A Collaborative Curriculum," J Chem. Educ., 74, 67.
- 5 Towns, M.H., Keke, J., Fields, A., "An Action Research Project: Student Perspectives on Small-Group Learning in Chemistry," J Chem Educ., 78, 7111.
- 6 Rossi, F. "Writing in an Advanced Undergraduate Chemistry Course: An Assignment Exploring the Development of Scientific Ideas," J Chem. Educ., 74, 79.
- 7 Bunting, R.K. "Writing for a Precise Science," J Chem. Educ., 74, 107.
- 8 Upgrading Existing Instrumentation Workshop, Dave Reingold, Organizer, the Council for Undergraduate Research National Meeting, In 1997.
- 9 Maintaining Expensive Instrumentation Workshop, Dave Reingold, Organizer, the Council for Undergraduate Research National Meeting, In 1997.
6. Hunter, A. H., "Regional Instrumentation Centers Workshop, Charles Wee, Organizer," the Council for Undergraduate Research National Meeting, In 1997.
5. Hunter, A. H., "Access to Scientific Instrumentation Poster and Workshop, Charles Wee, Organizer," the Council for Undergraduate Research National Meeting, In 1997.

Biographical Sketch for Daryl W. Macey

Department of Chemistry, Youngstown State University, Youngstown, OH 44403
 ①-734-dwmincey@ysu.edu, <http://www.as.ysu.edu/~dwmincey/index.html>

a. Professional Preparation:

University of Cincinnati	Chemistry	B.S.	1972
University of Cincinnati	Analytical Chemistry	M.S.	1974
University of Cincinnati	Analytical Chemistry	Ph.D.	1978

b. Appointments:

Youngstown State University	Chairperson	1999
Youngstown State University	Assistant Dean Arts and Sciences	1999
Youngstown State University	Full Professor	1999
Youngstown State University	Associate Professor	1998
Youngstown State University	Assistant Professor	1998
Mcysheer College	Assistant Professor	1997
Youngstown State University	Sabbatical Replacement	1998

c. Publications: *Denotes undergraduate students

1. *Monitoring of Electrochemical Reactions by Nuclear Magnetic Resonance Spectroscopy*, Daryl W. Macey, Mc J Popovich, Patrick J Faustino, Milyn M Hurst, and Joseph A. Caruso, *Analytical Chemistry*, 71, 1191-1196, 1999.
2. *Microprocessor Regulated Constant Voltage, Current, Voltage and Temperature Electrodes for Electrodeless Power Supply*, Daryl W. Macey, Kenneth J Kzior, Eslie H. Allen III, Ennina S. Frease, and Irene N. Strasser, *Analytical Chemistry*, 71, 1918-1922, 1999.
3. *The Analysis of Steel Samples Employing Ion Chromatography Sequential Inductively Coupled Plasma Atomic Emission Spectroscopy*, Jeffrey J Gligo, Daryl W. Macey, and James H. McE, *Analytica Chimica Acta*, 412, 2109-2112, 2000.
4. *Temperature Controlled Microwave Oven Digestion System*, Daryl W. Macey, Richard C. Wiams, Jeffrey J Gligo, Ge A. Gaves, and Anthony J Pacella, *Analytica Chimica Acta*, 412, 491-500, 2000.

d. Synergistic Activities:

Daryl's interest in science education spans twenty years. Dr. Macey is a member of the American Chemical Society, Penn-Ohio Border Section. He served as Treasurer 1998-1999, Chairperson-elect 1999-2000 and Chairperson 2000-2001. Daryl has received several Youngstown State University recognitions, a Chairperson Research Professorship for the 1999-2000 academic year, the Wilson Distinguished chairperson Award in 1999, a Chairperson Leadership Award in 1999, a Research Professor in 1999 and a Distinguished Professor in teaching 1999. He either independently or in collaboration with others has received grants from various state and national agencies. He received an Education for Economic Security Act (ESEA) grant of \$6,000 for his work in promoting Science Fair involvement in 1998. Dr. Macey was awarded a \$500 grant from the Ohio Board of Regents' Research Challenge Program in 1998 to study the interaction between various drugs and model lipid membrane systems by ATR-FTIR. Also in 1998 he cooperated with Dr. L Spiegel, R. Mma, and F. Barudi in a \$500 study of the correlation between vitamin C and zinc concentrations and sickle cell anemia. Dr. Macey, with Drs. CSutton, S. Mtin, L Schroeder, and I. Kan, has received two grants of \$500 in 1998 and \$500 in 1999. These grants developed techniques to model pollutant transport in the Monong River.

Drs. Schroeder, Mtin, and Macey have worked with the Youngstown State University Technology Development Corporation on a \$500 Ohio Department of Development Grant

titled: 'The Monong River Corridor Redevelopment Project.' Drs. Martin PI Mcey, and Schroeder received a National Science Foundation College Science Instrumentation Grant of \$100,000 in 1991 and another with Dr. Schroeder PI for \$100,000, in 1992 and another in 1993 with himself as PI. for \$50,000. Equipment was acquired to enhance a recently development environmental science curriculum both minor and major, establish a site for chemistry both undergraduates and graduates to experience real-life research problems using state-of-the-art instrumentation. Dr. Mcey was a Co-PI on a grant from the Ohio Board of Regents to introduce technology-aided instruction into the organic and quantitative analysis course offerings.

Dr Mcey was named Executive of the Year by the Youngstown-Monong County- Ohio Chapter of the International Association of Administrative Personnel for 1991. He has served on the Science Committee of the Industrial Information Institute for Education Inc. for 17 years. It is comprised of a group of science educators, primary, secondary, and university, and civic and business leaders whose goal is to facilitate science education in the Monong Mley.

Dr. Mcey was the founding Director of the District 15 of the Ohio Junior Academy of Science; an organization dedicated to the promotion of science education through hands-on research. The District 15 Science Fair has a yearly attendance of over 600 students. My district winners have also been highly successful at the Ohio State Science Fair. It is his experience in observing science fair participants that has developed his appreciation for hands-on, open-ended, problem-based learning.

Daryl's involvement with instrumentation dates back to graduate school, where he worked with Dr. Joseph Caruso, a renowned atomic spectroscopist, and received his Ph.D. in Analytical Chemistry. His thesis described the first time an electrochemical reaction was monitored by nuclear magnetic resonance spectrometry directly within the probe of the instrument. While receiving his Ph.D., Dr. Mcey was the graduate student operator of all NMR instruments at the University of Cincinnati.

At YSU teaching duties have included teaching graduate courses in analytical and clinical environmental chemistry and undergraduate courses in introductory, analytical, biological, and environmental chemistry. Three new courses were developed to reflect changes in the direction of analytical chemistry. They are Chemical Toxicology, Chemical Instrumentation Interfacing and Chemical Literature. In a collaborative effort with a biologist and a civil and environmental engineer developed the environmental studies program. He collaborated in developing and teaching two courses in environmental analysis. His major area of interest the elemental determination of metals in environmental samples. The directing of undergraduate and graduate research has been a significant responsibility for him. Twenty-six master students have received degrees under his direction. He has in addition directed 20 undergraduate research projects and was an atomic spectroscopy resource for many more.

e. Collaborator and Other Affiliations

i) Collaborators:

Dr. Kenneth Rosenthal, Department of Physiology, Northeastern Universities College of Medicine, Rootstown, Ohio.

Dr. Paul Peterson, Chair, Department of Biological Sciences, Youngstown State University.

Dr. Lauren Schroeder, Emeritus Professor, Department of Biological Sciences, Youngstown State University.

(i) Graduate Advisor

Dr. Joseph A. Caruso, Dean, Arts and Sciences, University of Cincinnati

Biographical Sketch for Stacey Lwery Bretz

Department of Chemistry, Youngstown State University, Youngstown, OH, 44403

sbretz@nich.edu

a. Professional Preparation:

Cornell University	Chemistry	B	19
Pennsylvania State University	Inorganic Chemistry	M	19
Cornell University	Chemical Education	PhD	19
University of California, Berkeley	Chemical Education	Post-Doc	19

b Appointments:Youngstown State University, Chemistry Associate Professor Starts: July 15th, 2000

University of Michigan-Dearborn, Chemistry Assistant Professor 1990

c. Publications: Stacey has a total of 9 peer reviewed publications (since 1990 when she joined U. Michigan) and has also given 2 oral poster presentations.**i) Most Closely Related Publications:**

1. Bretz, S. L. "Evaluation: An Introduction to Why and How," *Chemletter*, American Chemical Society Division of Chemical Education, Spring 1991, pp. 81-1.
2. Bretz, S. L. "Human Constructivism and Meaningful Learning," *JChemEduc*, in press
3. Bretz, S. L.; Arnold, J. "The Language of Chemistry," Submitted for publication to *J Coll. Sci. Teaching*.
4. Bretz, S. L. "What is Teaching? What is Learning? Using Fox's Hierarchy to Demonstrate an Educational Philosophy," Submitted for publication to *JChemEduc*.
5. Bretz, S. L. "Concept Maps: A Metacognitive Tool for Teaching Students to Learn How to Learn," *Chemistry in Context Instructor's Resource Guide*, W.C. Brown, 1991.

ii) Other Significant Publications:

6. Bretz, S. L. "CiC and Concept Maps," *Chemistry Now*, 1991, 181-9.
7. Bonmarito, S. L.; Lwery Bretz, S. P.; Abruña, H. D. "Homogeneous and Heterogeneous Synthesis of Redox Polymers and Copolymers of (Vinyl-4-methyl-2-bipyridine)₃PF₆ (Ru, Os)" *Synlett*, 1991, 6, 5.
8. Bonmarito, S. L.; Lwery Bretz, S. P.; Abruña, H. D. "Synthesis and Characterization of Redox Polymers of (Vinyl-4-methyl-2-bipyridine)₃PF₆ (Ru, Os)" *Inorganic Chemistry*, 1991, 31, 9.
9. Bonmarito, S. L.; Lwery Bretz, S. P.; Abruña, H. D. "Synthesis and Characterization of Redox Copolymers of Ru(Vinyl-4-methyl-2-bipyridine)₃PF₆ and Os(Vinyl-4-methyl-2-bipyridine)₃PF₆: Unusual Energy Transfer Dynamics," *Inorganic Chemistry*, 1991, 31, 62.

d. Synergistic Activities:

Stacey's research looks broadly at the roles of assessment, evaluation, metacognition, and reflection in improving both the teaching and the learning of chemistry. Her research has included both quantitative and qualitative papers addressing meaningful learning, science literacy, curriculum design and analysis, pedagogy, and assessment, and the pertinence of these to challenges facing both the teachers and the students of college chemistry. Her participation in the NSF Systemic Initiatives for College Chemistry with both the ChemLinks and the Modular Chem Consortia has spanned the range from evaluation design to classroom testing of the modular approach to teaching chemistry in the context of real-world problems or applications. A symposium organized on theories of learning (and currently in press) has received wide acclaim in the chemical education research community. Her leadership in the scholarship of chemical education includes recognition as a Project Kaleidoscope Faculty 2, and invitations to serve as a member of both the ACS DivCHED Committee on Chemical Education Research and the Examinations Institute Committee. Stacey is also deeply committed to improving the teaching of chemistry, from designing courses consonant with the National Science Education Standards for pre-service elementary teachers to organizing a

conference funded by the Dreyfus Foundation focusing on teaching assistant training in graduate chemistry departments.

e. Collaborators and Affiliations:

i) Collaborators:

Allen Hnter, Daryl Mcey, Sherri Lvelace-Cameron, and Timothy Wagner at YSU
Angelica Stacy, University of California, Berkeley
Bck Spencer, Hoit College
Conrad Stanitski, University of Central Arkansas
Elaine Seymour, University of Colorado
Errol Mhwald, Cornell University
Bretta Dnes, University of Northern Colorado
My Nakhleh, Purdue University
Peter Atkins, Oxford University
Rick Mg, Franklin Marshall College
Truman Schwartz, Malester College
Miam Robinson, Purdue University

ii) Graduate and Post Doctoral Advisors:

Angelica Stacy (Post-Doctoral Advisor) University of California, Berkeley
Joseph Novak (PhD Advisor) Cornell University
Roald Hoffmann (PhD Co-Advisor) Cornell University
Ayusman Sen (MAdvisor) Pennsylvania State University

iii) Thesis and Postgraduate Scholar Sponsor:

None at the graduate or post-doctoral level.

S. Letz has mentored nine undergraduate student researchers during her tenure at the University of Michigan-Dearborn.

Biographical Sketch for Larry S. Curtin

Department of Chemistry, Youngstown State University, Youngstown, OH, 44401, lscurtin@ysu.edu

a. Professional Preparation:

Northern Illinois University, Chemistry	Chemistry	B	1988
University of Wisconsin-Madison, Chemistry	Inorganic Chemistry	M	1990
University of Wisconsin-Madison, Chemistry	Inorganic Chemistry	PhD	1993
University of North Carolina-Chapel Hill	Electrochemistry	Post. Doc.	1995

b. Appointments:

Youngstown State University, Chemistry	Associate Professor	2000-present
Youngstown State University, Chemistry	Assistant Professor	1990-2000
Temple University	Assistant Professor	1989-1990

c. Publications: Larry has a total of 9 peer reviewed publications and has also given 10 oral/poster presentations.

(i) Most Closely Related Publications:

- Carley, T. D.; Lefaso, M.; Curtin, L.S. and Carley, R. Multiply Charged Redox-Active Oligomers in the Gas Phase: Electrolytic Electrospray Ionization Mass Spectrometry of Malloccenes," *J Phys. Chem B*, **9**, 1109, 1998
- Indis, K.; Hunter, A. D.; Winer, T. R.; Filler, F.; Linsenmum, S. A. and Curtin, L.S. The Synthesis and Characterization of Ni, Pd and Pt Mononitriledithiolate Complexes: X-Ray Crystal Structures of the Isomorphous Ni, Pd and Pt (Ph₂PCH₂CH₂PPh₂ Mononitriledithiolate) Congeners," *Inorg. Chim Acta*, **268**, 15, 1998
- Richardson, J.N.; Rowe, G.; Tender, L.; Curtin, L.S.; Peck, S. R.; Mray, R. W. Electron Transfer Kinetics of Self-Assembled Ferrocene Alkanethiol Monolayers on Gold Electrodes from 150 K to 170 K," *Electrochim Acta*, **44**, 13-18, 1999
- Peck, S. R.; Curtin, L.S.; Tender, L.; Merrill, R. H.; Mray, R.; Collman, J.P.; Little, W.A.; Duan, H.; Dong, C.; Hermann, A.; Rowe, G.; Creager, S. E. Electrochemistry of Self-Assembled Ferroceneoctanethiol Monolayers on Mal-Coated High Temperature Superconductor Electrodes at Sub-T_c Temperatures," *J Am Chem Soc*, **117**, 112-118, 1995
- Richardson, J.N.; Peck, S. R.; Curtin, L.S.; Tender, L.; Merrill, R. H.; Carter, M.T.; Mray, R.; Rowe, G.; Creager, S. E. Electron Transfer Kinetics of Self-Assembled Ferroceneoctanethiol Monolayers on Silver Electrodes at 115 K to 10 K," *J Phys. Chem*, **99**, 10, 1995
- Curtin, L.S.; Peck, S. R.; Tender, L.; Mray, R.; Rowe, G.; Creager, S. E. Voltammetry at 115 K for Self-Assembled Ferrocene-Tagged Alkanethiol Monolayers on Gold and Silver Electrodes in Dicyronitrile Ethyl Chloride Solvent," *J Am Chem Soc*, **117**, 5, 1995
- Peck, S. R.; Curtin, L.S.; Devitt, J.T.; Mray, R.; Collman, J.P.; Little, W.A.; Ziterer, T.; Duan, H.; Dong, C.; Hermann, A. The Response of the Double Layer Capacitance of a High Temperature Superconductor/Fluid Electrolyte Interface to the Onset of Superconductivity," *J Am Chem Soc*, **114**, 7-8, 1992
- Curtin, L.S.; Mellistrem, M.; Pietro, W. Doping and Anion-Exchange Thermochemistry of Electrochemically Prepared Polypyrrole," *J Phys. Chem*, **99**, 9, 1995
- Curtin, L.S.; Knipflin, G.; Pietro, W. Diffusive Anion Exchange in Polypyrrole Films," *J Phys. Chem*, **97**, 2, 1213, 1993

(ii) Other Significant Publications:

- Curtin, L.S.; Pietro, W. Student Solutions Manual to accompany Chemistry: Science of Change, Saunders College Publishing, Philadelphia, 1990.

d. Synergistic Activities:

Dr. Wacey typically has a large research group including graduate and undergraduate students. His research crosses many of the traditional boundaries in chemistry, involving organic, analytical and physical chemistry. Thus, his students are extremely well versed in such diverse areas as synthesis and synthetic methodology, spectroscopy, electrochemistry and X-ray diffraction. His research program is designed so that undergraduate and graduate students enjoy a great deal of success, as indicated by the many poster and oral presentations at local and national scientific meetings. Several honors students have done research related projects with Dr. Wacey to fulfill their additional requirements. Dr. Wacey has had extensive collaboration with Drs. Timothy Wynn and Allen Hunter on his X-ray crystallographic studies of transition metal compounds. He also has an on-going collaboration with Dr. Robin L. Carley at Louisiana State University which has already resulted in a publication in *The Journal of Physical Chemistry, B*. Dr. Wacey has also had extensive interaction with the local grade and high schools through the many chemical demonstration shows which he does every year. His emphasis in these shows is upon staying in school and that chemistry can be fun and a good career choice. These shows also help to educate the teachers on new and interesting ways to present chemistry, as well as acting as a recruiting tool to convince students on the benefits of an education at YSU.

e. Collaborators & Other Affiliations:**i) Collaborators:**

Robin L. Carley, Louisiana State University
 Allen D. Hunter, Youngstown State University
 Timothy R. Wynn, Youngstown State University

ii) Graduate and Post Doctoral Advisors:

William J. Pietro (PhD)
 Royce Wray, (Post. Doc.)

iii) Thesis and Postgraduate Scholar Sponsor:

William J. Filler, M19
 Francesca L. Filler, M19
 Ky Indis, M19
 Charles van Kk, M19
 Dr. Wacey has also served as the principle advisor of 14 undergraduate research associates.

Biographical Sketch for Janet E. Del Bene

Department of Chemistry, Youngstown State University, Youngstown, OH 44432

jdelbene@ysu.edu

a. Professional Preparation:

Youngstown State University	Education	B	1980
Youngstown State University	Chemistry	AB	1982
University of Cincinnati	Chemistry	PhD	1985
U. of Wisconsin, Madison	Theoretical Chemistry	Postdoc	1986
Millon Institute, Pittsburgh	NIH Postdoc		1987

b Appointments:

Youngstown State University, Chemistry	Professor Emeritus	1990
University of Florida	Adjunct Professor	1991-Present
University of Sydney, Australia	Visiting Professor	1991-2001

c. Publications: Janet has 10 peer reviewed publications. Papers published in 1990-2000 that are relevant to current research are listed below.

- Del Bene, J.E. and Jordan, M.T. "Rational Spectroscopy of the Hydrogen Bond: An Ab Initio Quantum Chemical Perspective," *International Review in Physical Chemistry*, **9**, 18, 1191 (invited chapter)
- Del Bene, J.E. and Jordan, M.T. In *Theoretical Spectroscopy: State of the Science*; A Comparative Study of Rational Anharmonicity in the Halide Ions F^- , Cl^- , Br^- *Spectrochimica Acta*, **9**, 5, 19 (invited article) special issue.
- Del Bene, J.E.; Perrera, S.A.; and Bartlett, R.J. "Hydrogen Bond Types, Binding Energies, and ^1H NMR Chemical Shifts," *J Phys. Chem A*, **9**, 10, 82.
- Del Bene, J.E. "N-N Spin-Spin Coupling Constants [^1H ^15N - ^15N] across N-H...N Hydrogen Bonds in Neutral Complexes: To What Extent Does the Bonding at the Nitrogens Influence $^1\text{J}_{\text{N-N}}$?" *J Am Chem Soc.*, (in press)
- Del Bene, J.E. and Jordan, M.T. "Rational Spectroscopic and NMR Properties of the Hydrogen Bonded Complexes: Do They Tell us the Same Thing?" *J Am Chem Soc.*, **9**, 12, 9
- Del Bene, J.E., Perera, S.A.; Bartlett, R.J.; Alkorta, I.; Elguero, J. " ^1H ^3P - ^3P Coupling Constants through N-H...N Hydrogen Bonds: A Comparison of Computed Ab Initio and Experimental Data," *J Phys. Chem A*, **9**, 10, 76
- Del Bene, J.E.; Perera, S.A.; and Bartlett, R.J. "Predicting NMR Coupling Constants Across Hydrogen Bonds: A Fingerprint for Specifying Hydrogen Bond Type?" *J Am Chem Soc.*, **9**, 12, 6.
- Gebel, J.; Ault, B.; and Del Bene, J.E. "Matrix Isolation and Ab Initio Study of the Hydrogen-Bonded Complexes between H_2O_2 and $(\text{CH}_3)_2\text{O}$," *J Phys. Chem A*, **9**, 10, 23
- Jordan, M.T. and Del Bene, J.E. "Unraveling Environmental Effects on Hydrogen-Bonded Complexes: Matrix Effects on the Structures and Proton-Stretching Frequencies of Hydrogen-Halide Complexes with Ammonia and Trimethylamine," *J Am Chem Soc.*, **9**, 12, 201.
- Szczepaniak, K.; Chabrier, P.; Person, W.; and Del Bene, J.E. "Experimental Infrared Spectra of Matrix Isolated Complexes of HCl with 4-substituted Pyridines. Evaluation of Anharmonicity and Matrix Effects Using Data from Ab Initio Calculations," *J Mol. Struct.*, **9**, 9, 1, (invited feature article)

d. Synergistic Activities

Dr. Delaney has garnered a national and international reputation in the fields of computational and theoretical chemistry. She has thirty years of experience working with both undergraduates and graduates with the importance of hydrogen bonding. Her data and insights have been employed to support the work of experimentalists in fields from biology to computer information science.

e. Collaborators and Affiliations**i) Collaborators:**

Dr. John A. Pople, Mellon Institute
Dr. Isaiah Shavitt, The Ohio State University

ii) Graduate and Post Doctoral Advisors:

Dr. Hans H. Jaffee (Ph.D.) University of Cincinnati
Dr. John A. Pople (Post Doc) Mellon Institute
Dr. John E. Harriman (Post Doc) University of Wisconsin, Madison

Biographical Sketch for Allen D. Hunter

Department of Chemistry, Youngstown State University, Youngstown, OH, 44403

adhunter@ysu.edu, <http://www.as.ysu.edu/~adhunter/index.html>

a. Professional Preparation:

University of British Columbia, Chemistry	Honors Chemistry	BS	1988
University of British Columbia, Chemistry	Inorganic Chemistry	PhD	1990
Australian National University, RSC	Organometallic Chemistry	Post. Doc.	1990
University of Alberta, Chemistry	Crystallography	Post. Doc.	1990

b. Appointments:

Youngstown State University, Chemistry	Full Professor	1999 Present
University of Pittsburgh, Crystallography	Visiting Associate Professor	1991-98
Youngstown State University, Chemistry	Associate Professor	1991-99
University of Alberta, Chemistry	Adjunct Professor	1991-99
University of Alberta, Chemistry	Assistant Professor	1991-99

c. **Publications:** Allen has a total of 40 peer reviewed publications since 1990 and has also given 60 oral poster presentations.

(i) Most Closely Related Publications:

- Smith, C. C.; Acyno, J.; Hunter, A. D.; Parkanzky, P. D.; Paxson, C. E.; Pekelnicky, P.; Harwood, J. S.; Hunter, A. D.; Lucarelli, M.; Lufaso, M.; Cutler, H. G. Nitration of Cyclopentenecarboxaldehyde: Studies Toward 1-Amino-2-Nitrocyclopentanecarboxylic Acid," *Tetrahedron Letters*, **39**, 670.
- Cashman, J. R.; Berkman, C. E.; Underliner, G. H.; Kelly, C. A.; Hunter, A. D.: Cocaine Benzoyl Thioester: Synthesis, Kinetics of Base Hydrolysis, and Application to the Assay of Cocaine Esterases," *Chem. Res. Toxicol.*, **11**, 991.
- Indis, K. G.; Hunter, A. D.; Winer, T. R.; Curtin, L. S.; Filler, F. L.; Jensen-Num, S. A: The Synthesis and Characterization of Ni, Pd, and Pt Monitriledithiolate Complexes: X-Ray Crystal Structures of the Isomorphous Ni, Pd, and Pt (Ph₂PCH₂CH₂PPh₂ Monitriledithiolate) Congeners," *Inorganica Chimica Acta*, **28**, 1519.
- Hunter, A. D.: Crystallographic Structure Determination: An Experiment for Organic Analysis and other Non-Traditional Issues," *Journal of Chemical Education*, **78**, 1919.
- Hunter, A. D.: *Allen Hunter's Youngstown State University X-Ray Structure Analysis Lab Manual: Beginner's Introduction*, Fall 1999 Edition FD1 © 1999, 27 pages. Has been released electronically as .pdf files to well over 200 individuals at over 16 Universities around the world. Described in the *Journal of Chemical Education*, **78**, 16 and in the ACA and IUCr Newsletters, see: <http://www.as.ysu.edu/~adhunter/YSUSC/index.html>

(ii) Other Significant Publications:

- Hunter, A. D.: A Capstone Writing Experience in Polymer Chemistry: Writing a Proposal to Management for the Purchase of New Polymer Characterization Instrumentation," *Journal of Chemical Education*, **78**, 14.
- Hunter, A. D.; Banconi, L. J.; DiMio, S. J.; Bho, D. E. Synthesis and Structure-Property Relationships in (⁶-AreneCrCO)₃ Chemistry: from Guided Experiments to Discovery Research. Physical Properties, IR, ⁵¹V and ⁵¹V Nuclear NMR Spectra, and Cyclic Voltammetry," *Journal of Chemical Education*, **78**, 9-9.

d. Synergistic Activities:

Allen's interests in the scholarship of teaching has been recognized at YSU by his being designated a Master Teacher in the College of Arts & Sciences, by his receiving substantial Faculty Development Funding for new curriculum innovations, and by his being appointed

the Science representative on the General Education Committee, at the state level by his being invited to be a founding member of The Ohio Project for Science Education, and at the national level by several NSF Teaching Instrumentation, Education Materials Development, and Curriculum Innovation grants. He is the representative for Ohio's Predominantly Undergraduate Institutions on the Ohio NRI and X-Ray Crystallography Research Consortia. He is on the Advisory Board of the Wick Foundation Center for Molecular Structure (Cal. State, Fullerton). He is also active in the International Center for Diffraction Data, including its Crystallographic Education subcommittee, in the Council of Undergraduate Research, and he is the organizer of sessions on crystallographic education at upcoming ACA and ACS national meetings. Finally, Allen is very involved with professional development opportunities for regional science teachers with whom he collaborates on his projects.

e. Collaborators and Other Affiliations:

i) Collaborators:

Alex Slawin, St. Andrews University (co-host for Dr. Hunter's 2000-2001 Sabbatical)
 Bernard Santarsiero, Scripps Institute
 Bryan Craven, Indiana University of Pennsylvania and the University of Pittsburgh
 Chase Smith, Holly Cross
 Derrick Willins, St. Andrews University (co-host for Dr. Hunter's 2000-2001 Sabbatical)
 George Richter-Addo, University of Oklahoma
 Jim Adrian, Union College
 John Cashman, Seattle Biomedical Institute
 Me Zworotko, University of South Florida
 Philip Coppens, University of Buffalo
 Simon Ott, University of Houston
 Steven DiMio, IBE High School

ii) Graduate and Post Doctoral Advisors:

Elliot Brnelli (B) University of British Columbia
 Peter Egzdins (PhD) University of British Columbia
 Martin Bennett (Post. Doc.) Australian National University
 Martin Cowie (Post. Doc.) University of Alberta
 Dietmar Seyferth (Collaborator while a Post. Doc.) MIT.

iii) Thesis and Postgraduate Scholar Sponsor:

XAndrew Go, PhD 19 (University of Alberta) Stan Tsai, PhD 19 (University of Alberta) Xochung Ng, M19 (YSU) Larry J Banconi, M19 (YSU) Stanislaus Tsai, PhD 19 (University of Alberta) Dianne Baho, M19 (YSU) Steven DiMio, M10 (YSU) and Bv Smith-Papa, M19 (YSU) ADH has served as the principle advisor for 2 PhD students, 6 students, 3 postdoctoral fellows, 3 research associates, and over a dozen undergraduate researchers.

Biographical Sketch for John A. Jackson

Department of Chemistry, Youngstown State University, Youngstown, OH 44555

A. ~~W~~ae. John A. Jackson obtained his B.A. degree in Chemistry in 1978 from the University of Minnesota. In 1979 he started graduate school at the University of Iowa, receiving his Ph.D in Organic Chemistry in 1981, while working with Professor David F. Wemer. The title of his dissertation was "New Chemistry of α -Phosphono β -keto Lactones." In the spring of 1981, John joined the laboratory of Professor Charles M. Thompson in the Chemistry Department at Loyola University Chicago as a postdoctoral research associate. While at Loyola, John worked on the synthesis of biologically active chiral organophosphorus compounds. In the fall of 1981 John accepted a Visiting Assistant Professor position in the Chemistry Department of Mansfield State University, in Mansfield Pennsylvania. John returned to Chicago during the summer of 1982 working again with Professor Charles M. Thompson at Loyola University. In the fall of 1982 John began his current position as an Assistant Professor in the Department of Chemistry at Youngstown State University. In 1985 he was granted tenure and promoted to Associate Professor. Dr. Jackson is a member of the American Chemical Society Organic Division, Agrochemicals Division and The Council on Undergraduate Research (CUR)

B. ~~W~~ Refereed Journal Publications. Ten most relevant publications.

1. Synthesis of α -Phosphono β -keto Lactones and Esters via Phosphate-Phosphonate Rearrangement. Jackson, J.A.; Hammond, G.B.; Wemer, D. F. *J Org. Chem* **48**, 5, 9.
2. Regiochemistry of the Rearrangement of Cyclohexenyl and Cyclohexadienyl Phosphates to β -keto Phosphonates. Ger, K.; Calogeropoulou, T.; Jackson, J.A.; Wemer, D. F. *J Org. Chem* **58**, 5, 3.
3. ~~M~~anolyis of Phosphoramidates with Boron Trifluoride-Methanol Complex. Ryu, S.; Jackson, J.A.; Thompson, C. M. *J Org. Chem* **58**, 5, 9.
4. Stereoselective and Chemoselective Oxidation of Phosphorothionates using ~~MP~~. Jackson, J.A.; Berkman, C. E.; Thompson, C. M. *Tetrahedron Lett.* **33**, 66.
5. Synthesis of Chiral Phosphorus Esters Derived From Serine. Jackson, J.A.; Frick, J.A.; Thompson, C. M. *Bull. Chem. Soc. Jpn.* **66**, 2, 13.
6. Stereochemical Aspects of Phosphorothiolate Toxicity. Thompson, C. M.; Berkman, C. E.; Ryu, S.; Jackson, J.A.; Quinn, D. A.; Arsen, A. In *Rev. Pestic. Toxicol.* Roe, R. and Ehr, R. J. Eds.) Toxicology Communications Inc., **1987**, 2, 13-16.
7. Synthesis of Phosphorylated Tripeptides Representing Poisoned Acetylcholinesterase. Thompson, C. M.; Suarez, A. I.; In, J.; Jackson, J.A. *Tetrahedron Lett.* **33**, 9.
8. Stereocontrol in Horner-Emmons Condensations of α -Phosphono β -keto Lactones with Aldehydes: A Synthesis of Intergerrineic Acid and Senecic Acid β -keto Lactones. Jackson, J.A.; Wemer, D. F. *J Org. Chem* **58**, 8, 5.
9. Improved Synthesis of bis(2-Trifluoroethyl)Phosphorochloridate. Bowman, R. A.; Stock, J.R.; Jackson, J.A. *Org. Prep. Proced. Int.* **1987**, 31, 9.
10. Michaelis-Bcker Synthesis of bis(2-Trifluoroethyl)Phosphonoesters. Ciszewski, G.M.; Jackson, J.A. *Org. Prep. Proced. Int.* **1987**, 31, 9.

C. ~~W~~ Names of Graduate and Undergraduate Students Supervised.

1. MTheses Supervised. Kevin A. Lawrence (1987) Kly A. Mison (1988) Russell A. Bowman (1989) Miam Mallen (1990) Joseph R. Stock (1991) Gregory Ciszewski (1992) Agozie Oyeamalu (in progress) M. Cote (in progress) Bob Kwach (in progress)
2. Undergraduate Research Students. Diana R. Arnett (1987) Me Petrino (1988) Andrea Howie (1989) David Benson (1990) Jason A. Smulik (1991) Todd Emch (1992)

Tim Styrane (1999) De Kpcash (1999) Christopher Ibedz (1999) Robert Kvach (1999) Anu Manti (1999) Christine Novicky (1999) Nick Dasovich (1999) Manie Sekowski (1999) Kie Kzmiller (1999-2000) Gg Pannucio (1999-2000) M Shipton (2000) Rian Qnn (2000)

D. Names of Advisors.

1. Ph.D. Advisor. Dr. David F. Wmer, Department of Chemistry, The University of Iowa, Iowa City, IA 52242
2. Postdoctoral Advisor. Dr. Charles MThompson, Department of Chemistry, Loyola University Chicago, Chicago, IL 60607 Current Address: Department of Chemistry, University of Montana, Missoula, MT 59717

Biographical Sketch for Sherri R. Lovelace Cameron

Department of Chemistry, Youngstown State University, Youngstown, OH, 44555

srlvela@ysu.edu, http://cc.ysu.edu/~srlvela/index.html

a. Professional Preparation:

Drexel University, Chemistry	Chemistry	B	1988
University of Pittsburgh, Chemistry	Organometallic Chemistry	PhD	1992
University of Vermont, Chemistry	Electrochemistry	Post. Doc.	1999

b. Appointments:

Youngstown State University, Chemistry Assistant Professor 1999-Present

c. Publications:**(i) Most Closely Related Publications:**

1. Connelly, N. G.; Eger, W. E.; Lovelace, S. R.; Metz, P.; Paget, P.; Wier, R.: Reduction of Alkynes $2(C_5R'_5)^+ M$ or $M(CN$ or CO, RH or $M(C_5R'_5)(C_5HPh_4)$ Characterization of Radical Intermediates in the Reductive Coupling of Coordinated Alkynes." *Organometallics*, **9**, 18, 81-87
2. Rulkens, R.; Hugh, A. J.; Miners, I.; Lovelace, S. R.; Cant, C.; Eger, W. E.: Near Oligo ferrocenyldimethylsilanes with between Two and Nine Ferrocene Units: Electrochemical and Structural Models for Poly ferrocenyldimethylsilane High Polymers," *J Am Chem Soc.*, **118**, 1818
3. Keslag, M. A.; Bird, M. C.; Lovelace, S. R.; Eger, W. E.: Synthesis and Properties of the 17-Electron, Tantalum-Centered Radical $Ta(CO)_4(Ph)_2PCH_2CH_2PPh_2$ " *Organometallics*, **15**, 92
4. Lee, S.; Lovelace, S. R.; Arford, D. J.; Gib, S. J.; Wier, S. C.; Cooper, N. J.: Reductively Induced Dimerization of the 18-Electron Benzene in $M^-(C_6H_6)(CO)_3]^+$: Formation of the Initial C-C Bond by Anion-Cation Addition," *J Am Chem Soc.*, **118**, 49-49.
5. Lee, S.; Lovelace, S. R.; Cooper, N. J.: Two-Electron and One-Electron Reduction of the Indenyl Complex $M^-(C_9H_7)(CO)_3]$ and Reversible Counterion-Controlled Comproportionation of $M^-(C_9H_7)(CO)_3]$ and $M^-(C_9H_7)(CO)_3]^2$ To Give $M^-(C_9H_7)(CO)_3]$," *Organometallics*, **14**, 199

(ii) Other Significant Publications:

6. Chin, T. C.; Lovelace, S. R.; Eger, W. E.; Davis, C. M.; Mims, R. N.: Infrared Spectroelectrochemistry of Iron-Hydrogen Stretches: A Tool for Diagnosis of Delocalization in Med-Ment Metallacarborane Complexes," *J Am Chem Soc.*, **116**, 99.

d. Synergistic Activities:

Sherri actively participates in, and coordinates much of, YSU's outreach activities to members of communities traditionally under-represented in science. Indeed, she has been involved in such efforts since graduate school. She has extensive experience working with Youngstown's majority minority Public School system. She is the creator and coordinator of the YSU Summer Science Academy program for 7th and 8th graders. The goal of this summer program is to encourage students of color to excel, and to continue their interest in the sciences. At the Science Academy students perform hands on activities that require the integration of math and science skills. The activity modules utilize computer technology and combined both physical and life sciences. She is also currently serving as the coordinator for the Delta Leadership Academy. The academy is an after school program for at risk girls, between the ages of 11 to 14. The academy encourages the consideration of careers that utilize science, math, and technology. She has been the Director of the YSU Chemistry Department's ACS SEED Project for three years. As an African American scientist, she is a role model and mentor for YSU's African American students, many of whom she has influenced into switching into science and technology degree programs. She has also worked

closely with other members of our African American Studies program to institute a new Course, Chemistry 02African and African American Contributions to Science. For her work in science education, she has been selected as a Master Teacher by the College of Arts & Sciences and been designated a Project Kaleidoscope F2 Scholar.

e. **Collabrators &er Affiliations:**

i) Collabrators:

Fola Idipo, University of Kentucky
Allen Hunter, Youngstown State University

ii) Graduate and Post Doctoral Advisors:

N. John Cooper (PhD) University of Pittsburgh.
Wiam E. Giger (Post. Doc.) University of Vermont

iii) Thesis and Postgraduate Scholar Sponsor:

Catchen Mz, M 19 Sherri has also mentored 4 pre-college students, and 7 undergraduate students (including 4thesis students and 2minority work program students)in her group over the last 5years.

Biographical Sketch for Howard M. Mee
 Department of Chemistry, Youngstown State University, Youngstown, Ohio 44432
 hmtee@ysu.edu

a. Professional Preparation:

Middlebury College	Chemistry	B.S.	1968
University of Calgary	Physical Chemistry	PhD	1970
National Research Council (Ottawa)		PostDoc	1971
University of Texas (Austin)		PostDoc	1972
University of California, Berkeley		Sabbatical	1973
St. Petersburg Forest Technical Academy		Sabbatical	1974

b. Appointments:

Youngstown State University Assistant Professor	1975
Associate Professor	1979
Professor	1983

c. Publications:

- Mee, H.D., "Photoelectrochemical Catalysis with Polymer Electrodes," *ACS Symposium Series* 2, 1-3
- Mee, H.D., Ford, W., Sakai, T. and Calvin, M., "Temperature Dependence of Photosensitized Electron Transport Across Lipid Vesicles," *Photochem Photobiol.*, 39, 1-3
- Del Bene, J.E., Mee, H.D., Shavitt, I., "The Structure, Binding Energy and Vibrational Frequencies of $\text{CH}_3\text{CN} \cdot \text{HCl}$," *J Phys. Chem* 9, 9, 1-3
- Del Bene, J.E., and Mee, H.D., "An ab Initio Study of the Complexes of HF with the Chloromethanes," *J Phys. Chem* 9, 9, 1-6
- Kolkin, Y.I., Glazov, V.K., Vand Mee, H.D. "Purification of Carbohydrate-Containing Substrates from Plant Biomass," *Ap. Bios Btech.*, 2, 2, 1-3
- Kolkin, Y.I., Marov, W., Glazov, V., Elkin, A. and Mee, H.D., "Technological and Ecological Aspects of Ethanol Production from Wood," *Proc. Burth Bios Conf Of Aricas*, 2, 2, 1-3

d. Synergistic Activities:

Because many chemical reactions are caused by initially stable reactant molecules acquiring enough energy to react, the ways molecules gain and then internally distribute energy are important to understand. Whether absorbed by heat or light, energy restricted to few vibrational modes may not be in the proper "reaction coordinate" and thus may not be available to assist a reaction. The molecule of nitromethane is an interesting case since it is small enough to have moments of inertia that give resolvable rotational structure, and it has an internal methyl rotor that can couple CH vibrations and NO vibrations. Thus with the proper infrared spectroscopic resolution (0.001 cm^{-1}) at low enough sample temperatures (0-10 K) such as are achievable in molecular beams, one can get detailed information about these couplings.

This is the main theme of the IR project now underway in collaboration with Dr. David Perry at the University of Akron, where most of the physical equipment is. The particular point to be investigated is what role the NO_2 stretching motions couple with the CH stretching and bending. Is it through a Coriolis type of interaction, or perhaps Fermi resonance. Dr. Perry has a lot of experience with the similar but related methanol molecule. Much of the analysis can be done here on a desktop computer with IGR software. To duplicate the molecular beams, F-centered laser pumped by a powerful additional krypton ion laser available at Akron would require about 1 million dollars. A graduate student in our masters program might easily pave the way for a PhD degree there.

The second project is more in tune with undergraduate abilities and involves using computer modeling in the Spartan program suite to mimic initial, final and transition states (in the gas phase and solution) for some simple reactions to see what level of theory is appropriate to

give results for rate and equilibrium constants for known chemical reactions. One might then employ these same methods for reactions of model systems that are under study by various research groups in the department. Then, one might get some preliminary idea if a particular synthetic strategy will have a great tendency to actually occur, and if so, would the reaction be fast enough to be practical, or would it require a catalyst. Theory has reached the point where it has such practical applications today, and it is being introduced into the undergraduate curriculum across the country.

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Biographical Sketch for James H. Macey, Ph.D.

Department of Chemistry, Youngstown State University, Youngstown, Ohio 44555

EMPLOYMENT

ASSOCIATE PROFESSOR, College of Arts & Sciences, Youngstown, Ohio (to present)
PROFESSOR, Dept. of Chemistry, Youngstown State University, Youngstown, Ohio (to present)
RESEARCH ASSOCIATE, Dept. of Biochemistry and Molecular Pathology, Northeastern Ohio Universities College of Medicine, Rootstown, Ohio (to 1988)
PRODUCED, Bowman Pharmaceuticals, Inc., Canton, OH (1988 to 1991)
RESEARCH ASSISTANT, University of Cincinnati and Youngstown State University.
STUDENT, Mount Carmel Medical Center, Columbus, Ohio (to 1988)

EDUCATION

- Ph.D.** -- University of Cincinnati, Cincinnati, Ohio (1980 to 1984)
 • Dissertation: *The Determination of Catecholamines in Biological Fluids Using Microbore Liquid Chromatography with Fluorescence Detection* "
- M.S.** -- Youngstown State University, Youngstown, Ohio (1980 to 1981)
 • Thesis: *Analysis of Some Transition Metals by High Pressure Liquid Chromatography* "
- B.S.** -- Youngstown State University, Youngstown, Ohio (1978 to 1980)
 • Medical Technology major.

PROFESSIONAL AFFILIATIONS

- American Chemical Society.
- Sigma Xi Honorary Research Society.
- Phi Kappa Phi Honor Society.

SYNOPSIS

Research: I have over twenty years of experience with chromatographic separations of all types in many different situations. Various modes of HPLC have often been the principle focus of research, but I have had experience with virtually all modes of chromatography. In the 1980s, I was involved with development of instrumentation and worked for a generic pharmaceutical company developing chromatographic methodology for OTC, prescription, and natural pharmaceuticals. At that time, I also performed stability testing of pharmaceuticals and developed supporting HPLC methods. I have a wide range of experience in the development of chromatographic methods for complex biochemical systems as well, having spent several years working and collaborating with medically related projects (cholesterol, bile acids, Catecholamines, etc.) My beginning faculty years were spent developing derivatization methods for solute detection based on chemical and electrochemical flow reactors (chemical and immobilized enzyme) as well as technologies based on UV, electrochemistry, fluorescence, chemiluminescence, and emission spectroscopy. The last several years have been spent dealing with chromatographic stationary phase development. I have a deep and fundamental understanding of chromatography and development of chromatographic separations in many (and complex) matrices.

Education: I have had many undergraduate and graduate students work under my direction and understand how to compartmentalize a project into doable parts that are partitioned among

several individuals. I have had success at helping students complete projects and virtually all have gone on to successful careers in graduate and professional schools, and in the workforce.

PUBLISHED PAPERS

1. *Postcolumn Oxidation of Purpald Aldehyde Adducts at Metal Electrodes* "T. Merr and J.H. Me, **Journal of Chromatography**, **9**, 83232
2. *An Electrochemical Reactor for Postcolumn Fluorescence Detection of Catecholamines by HPLC.* "J.H. Me and B. Ramos, **Microchemical Journal** **1**, **9**, 730.
3. *Temperature Enhanced Chemiluminescence for Determination of Cholesterol.* "J.H. Me and T.J. Cleland, **Analytica Chimica Acta**, **9**, 938
4. *Trace Metal Analysis Using Ion Chromatography and Sequential ICP-AES* "J. Galio, J.H. Me, and D. Wincey, **Analytica Chimica Acta**, **9**, 109112
5. *Electrochemical Enhancement of High Performance Liquid Chromatography Detection for Determination of Phenylpropanolamine.* "J.H. Me, B. Ramos, and T.A. Zipp, **Journal of Chromatography**, **9** 581617

EDUCATIONAL EXPERIENCES

- Vincent Merr, Department of Surgical Education, St. Elizabeth's Medical Center, Youngstown Ohio.
- Jacques Goteaux, Department of Anatomy, Northeastern Ohio Universities College of Medicine, Rootstown, Ohio.

Biographical Sketch for Peter Norris

Department of Chemistry, Youngstown State University, Youngstown, OH, 44403
 pnorris@ysu.edu, http://www.as.ysu.edu/pnorrispublic.html/

a. Professional Preparation:

Salford University, England	Chemistry	BSc	1980
The Ohio State University, Chemistry	Organic Chemistry	PhD	1982
American University	Carbohydrate Chemistry	Post. Doc.	1983

b Appointments:

Youngstown State University, Chemistry	Associate Professor	2000-Present
Youngstown State University, Chemistry	Assistant Professor	1990-2000
Ohio Wesleyan University	Visiting Lecturer	1989

c. Publications: Norris has a total of 14 peer reviewed publications (all since 1980) and has also given 2 oral/poster presentations.

(i) Most Closely Related Publications (those marked with an asterisk indicate undergraduate co-authors)

1. Dipolar Cycloaddition Reactions of a Soluble Polymer-Supported Dipolarophile. Synthesis of Sugar-derived Triazoles," M. More and P. Norris, *Tetrahedron Letters*, **9**, 1001, 1978.
2. Chiral Tetrahydrofuran Synthesis from D-Ribose Diphenyl Dithioacetal," P. Norris, *Heterocyclic Communications*, **5**, 113, 1974.
3. Synthesis of Carbohydrate-derived 1,2-Triazoles Using 1,3-Dipolar Cycloaddition on a Soluble Polymer Support," S. Freeze and P. Norris, *Heterocycles*, **5**, 187, 1974.
4. Solution and Solid State Structure of D-2,3-Anhydro-1,1-bis(ethylsulfonyl)-3,5-trihydroxy-hexane," P. Norris and T.R. Wyner, *Carbohydrate Research*, **32**, 141, 1974.
5. Development of Reactions of 6 and 5-Substituted-1,3-dimethyluracils with Dimethylsulfoxonium Methylide," P. Norris and H. Shechter, *J. Org. Chem.*, **40**, 909, 1975.
6. A Convenient Synthesis of Glycosyl Chlorides from Sugar Hemiacetals Using Triphosgene as the Chlorine Source," R. Cichillo and P. Norris, *Carbohydrate Research*, January 1976, in press.
7. Synthesis of a Partially Protected Azidodeoxysugar: A Project Suitable for the Advanced Undergraduate Chemistry Laboratory," P. Norris, S. Freeze and C.J. Gabriel, *J. Chem. Ed.*, **53**, 100, 1976, in press.*

(ii) Other Publications:

8. Dialkyl Dithioacetals of Sugars," D. Horton and P. Norris, in "Preparative Carbohydrate Chemistry," S. Hanessian (ed.) Marcel Dekker, New York, NY, 1976, p. 107.
9. Synthesis of 1,5-Dideoxy-1,5-amino-D-xylonolactam via Acid-catalyzed Intramolecular Schmidt Rearrangement," P. Norris, D. Horton, and R. Irvine, *Tetrahedron Lett.*, **6**, 113, 1976.
10. Characterization and Interconversions of 2-S-Ethyl-2-thio-D-mannose Diethyl Dithioacetal and the Facile Interconversion of 2-Thio-D-mannopyranose Derivatives," D. Horton, P. Norris, and B. Brang, *Carbohydr. Res.*, **8**, 107, 1976.
11. Cycloaddition of Cyclopentadiene to 3-Deoxy-1,5-di-O-isopropylidene-D-erythro-hex-2-enofuranose: Synthesis and Representative Chemistry of 1,6-Anhydro-2-dideoxy-D-glycero-hex-2-enopyran-4-ulose (solevogluconone)" D. Horton, J.P. Roski, and P. Norris, *J. Org. Chem.*, **41**, 100, 1976.

- 12 Intramolecular 1,3-Dipolar Cycloadditions of 5-Azido-5-deoxyaldopentose Ketene Dithioacetal Sulfones in the Synthesis of Imino Sugar Analogs," P. Norris, D. Horton, and D.E. Gidhar, *Tetrahedron Lett.*, **3**, **1**, **98***
- 13 Cycloaddition of Acetylenes with 5-Azido-5-deoxy-D-aldopentose Derivatives: Synthesis of Triazole Reversed Nucleoside Analogs," P. Norris, D. Horton, and R. Evine, *Heterocycles*, **3**, **1**, **28***
- 14 5-Deoxy-5-C-(ethoxycarbonyl-1,2,3-triazol-1-yl)-1,2-O-isopropylidene-D-xylofuranose," D. Horton, R. Evine, P. Norris, R.L. Luck and J.V. Silverton, *Acta Crystallographica C* **5**, **1**, 10-12*

d. Synergistic Activities:

Since joining the chemistry department at YSU, Norris has developed a sizeable research group involving both undergraduate and Mgraduate students. He has worked to integrate his teaching and research interests by bringing experiments from the research laboratory into the undergraduate curriculum, and several of these exercises are under consideration for publication in the *Journal of Chemical Education*. Norris's research interests focus on the chemical synthesis of carbohydrate analogs as potential modulators of enzyme activity, a subject of great current interest to bioorganic chemistry and the pharmaceutical industry. With the interface between chemistry and biology becoming increasingly blurred, students from the Norris group gain an overall experience that provides them with the tools to either continue their studies in graduate school, or to move into the chemical industry. Within the sciences at YSU, Norris and his students are collaborating with both chemists (e.g. Tim Wigner in crystallography) and biologists (e.g. Diana Fagan in microbiology) and this is fostering an excellent atmosphere for learning at the undergraduate level.

e. Collaborators and Affiliations:

i) Collaborators:

Tim Wigner, Diana Fagan, Youngstown State University

ii) Graduate and Post Doctoral Advisors:

Harold Shechter (PhD) The Ohio State University

Derek Horton (Post. Doc.) American University

iii) Thesis and Postgraduate Scholar Sponsor:

W.L.M. Martin, M. Scott Freeze, M. Robert Cicchillo, M. 000, Andrew Fluxe, M.001, Dan Berndt, M.001, Hud Risley, M.001, Jason McCartney, M.001, De Isko, M.002 Norris has also served as research advisor for 2 undergraduate students.

Biographical Sketch for Mhael A. Serra

Department of Chemistry, Youngstown State University, Youngstown, OH, 44555

maserra@ysu.edu

a. Professional Preparation:

Adrian College	Biology, M.S.	B.S.	1998
Iowa State University	Biochemistry	Ph.D.	1999
Michigan State University	X-ray crystallography	Res. Assoc.	1999

b Appointments:

Youngstown State University, Chemistry	Associate Professor	2000-present
Youngstown State University, Chemistry	Assistant Professor	1999
Hiram College, Chemistry	Assistant Professor	1999
Hope College, Chemistry	Writing Assistant Professor	19-19

c. **Publications:** Mhael has 5 peer reviewed publications and has made 8 poster or seminar presentations.

i) Most Closely Related Publications (those marked with an asterisk indicate and undergraduate co-author)

1. Cornu-ibat, G.M.A. Serra; A. H. Smith; W. McGor; K. Kirajan; M. Hirko; J. J. Turner; J. R. Rubin: "Systemic Consequences of Oxidative Stress following Aortic Surgery Correlate with the Degree of Antioxidant Defenses," *Am. J. Surg.*, **140**, 33

ii) Other Publications:

1. W. Poland; M. Silva; M. A. Serra; Y. Cho; K. H. Kim; E. M. Harris; R. B. Honzatko: "Crystal Structure of Adenylosuccinate Synthetase from *Escherichia coli*: Evidence for Convergent Evolution of CP Binding Domains," *J. Biol. Chem.*, **273**, 233
2. Serra, M.A.; B. Dorner; M.E. Silver: "Structure of an Adenine-Hydrogen Peroxide Adduct," *Acta Crystallogr.*, **2**, C8, 1990.
3. Serra, M.A.; B. Dorner, M.B. Fromm, H. J and Honzatko, R. B. "Preliminary X-ray Crystallographic Study of Adenylosuccinate from *Escherichia coli*," *J. Mol. Biol.*, **210**, 33
4. Serra, M.A. and Honzatko, R. B. "Structure of 1- β -Nitrobenzylideneaminoguanidinium," *Acta Crystallogr.*, **2**, C2, 1993

d. Synergetic Activities:

Mhael's research has focused on the site-specific nature of oxidative damage caused by reactive oxygen species (ROS) produced when transition metals react with hydrogen peroxide. A protein's susceptibility to oxidative damage may depend on features of its three dimensional shape and has been described as a "aged" reaction. It is also likely that the primary sequence may be important in determining the site of oxidative damage since the metal ion must bind to the protein. Histidine, for example, is known to tightly bind both copper and iron ions.

One of Mhael's primary duties is to coordinate the teaching of allied health chemistry which routinely serves over 200 students a year. His responsibilities include preparation of the lecture and laboratory syllabi, selection of texts, and oversight of the graduate students who serve as instructors for the laboratory. In addition, Mhael enjoys performing chemistry shows for pre-school, elementary and middle school students.

e. Collaborators & Other Affiliations:

i) Collaborators:

Wien Yee, Cleveland Clinic Foundation

(i) Graduate and Post Doctoral Advisors:

Richard B. Honzatko (Ph.D.) Iowa State University

Alexander Tulinsky (Res. Assoc.) Michigan State University

(ii) Thesis and Postgraduate Scholar Sponsor:

Antoinette M. Gallito, M. 1994
Kathleen A. Kolek, M. 1994
M. 1994 M. 1994 has served as a research advisor to 9 undergraduates students and 2 high school students associated with ACS Project SEED.

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Biographical Sketch for Jeffrey A. Smiley

Department of Chemistry, Youngstown State University, Youngstown, OH, 44603
 jasmiley@ysu.edu, <http://www.as.ysu.edu/jasmiley/index.html>

a. Professional Preparation:

Eastern Kentucky University	Chemistry	B.A.	1989
University of North Carolina	Biochemistry and Biophysics	Ph.D.	1991
Pennsylvania State University	Chemistry	Post-Doc.	1991-1992

b. Appointments:

Youngstown State University, Chemistry	Associate Professor	1991	Present
Youngstown State University, Chemistry	Assistant Professor	1989	1991

c. Publications: Student contributors are underlined>

- Smiley, J.A., and Asch, D. K. Identification of a Gene Encoding a Synthetase from a *Nurospora crassa* cDNA Library by Bacterial Complementation. (2000) *Fungal Genetics Newsletter*, **4**, 9
- Mer, B.G., Smiley, J.A., Short, S. A., and Wfenden, R. Activity of Yeast OMDecarboxylase in the Absence of Mals. (1991) *JBL. Chem* **4**, 3-8
- Smiley, J.A., and Saleh, L. Active Site Probes for Yeast OMDecarboxylase: Inhibition Constants of UMano and Thio-substituted UMano Analogs, and Greatly Reduced Activity Toward CMCcarboxylate. *Borganic Chemistry*, **2**, 936
- Smiley, J.A., Angelot, J.M., Cannon, R. C., Marshall, E. M., and Asch, D. K. Radioactivity-based and Spectrophotometric Assays for Iso-orotate Decarboxylase: Identification of the Thymidine Salvage Pathway in Lower Eukaryotes. (1991) *Analytical Biochemistry*, **6**, 82
- Mer, C.P., Wong, W., Smiley, J., and Enkovic, S. J. Combinatorial Libraries of Peptides, Proteins, and Antibodies Using Biological Systems. In *Combinatorial Chemistry: A High Tech Search for Drug Candidates*, pp. 1-9. Wiley Sons, New York, 1991
- Smiley, J.A., and Enkovic, S. J. Expression of an Orotate Decarboxylating Catalytic Antibody Confers Fluoro-orotate Sensitivity to a Pyrimidine Auxotrophic *Echerichia coli*: An Example of Intracellular Prodrug Activation. (1991) *JAr. ChemSoc.* **1**, 88
- Smiley, J.A., and Enkovic, S. J. Selection of Catalytic Antibodies for a Synthetic Reaction from a Combinatorial cDNA Library by Complementation of an Auxotrophic *Echerichia coli*: Antibodies for Orotate Decarboxylation. (1991) *Proc. Mt. Aad. Sci. SA* **9**, 893
- Posner, B.A., Smiley, J., Lee, I., and Enkovic, S. J. Catalytic Antibodies: Perusing Combinatorial Libraries. (1991) *Tends in BiochemSci.* **9**, 145.
- Smiley, J.A., and Jones, M.E. A Unique Catalytic and Inhibitor-binding Role for Ys9f Yeast Orotidylate Decarboxylase. (1991) *Bchemistry* **3**, 1233
- Smiley, J.A., Paneth, P., O'Leary, M.L., Hill, J.B., and Jones, M.E. Investigation of the Enzymatic Mechanism of Yeast Orotidine-5-Monophosphate Decarboxylase Using C-13 Kinetic Isotope Effects. (1991) *Bchemistry* **6**, 363

d. Synergistic Activities:

Since joining the YSU Faculty in 1991, Dr. Smiley has been awarded grants from both Research Corporation and the American Chemical Society Petroleum Research Fund. He has recently been granted internal funding for the Presidential Academic Center for Excellence in Research at YSU, for the establishment of the Center for Biotechnology, in collaboration with Peter Norris (YSU Chemistry) and Diana L Fagan (YSU Biology). He has been nominated by the department for the Henry Dreyfus Teacher-Scholar Award.

Dr. Smiley has made significant contributions to the study of OMDecarboxylase, an enzyme of enormous current interest among enzymologists. His research interests span the chemistry-biology interface, from a collaboration with Janet DeLone on *ab initio* calculations of nitrogen isotope effects, to gene cloning projects with David Asch of the YSU biology department.

Dr. Smiley is currently remodeling the department's second-semester biochemistry laboratory course. This course will be structured to resemble the logical progression of research experimentation used by enzymologists. Experiments will be offered in gene cloning, gene sequence determination, enzyme assay development, enzyme kinetics, protein purification, inhibition assays, studies on the enzyme's physical properties, mutagenesis, and protein modification experiments. The enzyme OMDecarboxylase, which has been the subject of Dr. Smiley's research for many years, is particularly well-suited for all of these experiments and will be the subject of this integrated, research-based course.

e. Collaborators and Affiliations:

(i) Collaborators:

Peter Norris and Janet E. DeLone at YSU (Chemistry)
David KAsch and Diana LFagan, YSU Department of Biological Sciences
Richard WFenden, University of North Carolina
Peter LRinaldi, University of Akron

(ii) Graduate and Post Doctoral Advisors:

My Ellen Jones (Ph.D.) University of North Carolina (deceased)
Stephen Jankovic (Post-Doc.) Pennsylvania State University

(iii) Thesis and Postgraduate Scholar Sponsor:

Renita Cannon, M., 19 Julie Angelot, M., 19 Danny Yun, M., 19 Lina Saleh, M., 19 Supervised undergraduate research for 11 students.

Biographical Sketch for Timothy R. Wagner

Department of Chemistry, Youngstown State University, Youngstown, OH, 44403
 333-210, trwagner@ysu.edu, <http://www.as.ysu.edu/~trwagner/index.html>

a. Professional Preparation:

University of Wisconsin - River Falls	Chemistry	B.S.	
Arizona State University, Chemistry	Solid State Chemistry	PhD	1988
Hughes Aircraft Company	Radar Software		1989
Northwestern University, Materials	Electron Microscopy	Post. Doc.	1990

b. Appointments:

Youngstown State University, Chemistry	Associate Professor	1992-Present
Youngstown State University, Chemistry	Assistant Professor	1989-1992
Illinois Institute of Technology, Chemistry	Visiting Assistant Professor	1989-1990

c. Publications: Tim has a total of 8 peer reviewed publications (4 since 1992) and has also given 4 oral poster presentations.

(i) Most Closely Related Publications (those marked with an asterisk indicate undergraduate co-authors)

- Norris, P. and Wagner, T.: Solution and Solid State Structure of the Anhydro-1,1-bis(ethylsulfonyl)-1-deoxy-D-talitol," *Carbohydrate Research*, **9**, 322, 1976.
- *Indis, K, Hunter, A., Wagner, T., Curtin, E, Filler, F., Jensen-Mnum, S.: The Synthesis and Characterization of Ni, Pd, and Pt Monitriethiolate Complexes: X-Ray Crystal Structures of the Isomorphous Ni, Pd, and Pt Congeners," *Inorganica Chimica Acta*, **9**, 138, 15-18
- *Wagner, T.; Styranec, T.: Preparation and Crystal Structure Analysis of $\text{Ba}_2\text{Hg}_{11}\text{O}_{20}$," *J Solid State Chem*, **9**, 138, 33-40.
- Wagner, Preparation and Crystal Structure Analysis of Magnetoplumbite-Type Bismuth Hexagallate," *J Solid State Chem*, **9**, 136, 10-12

(ii) Other Publications:

- Wagner, T.: HREM of Electron-Beam-Induced Damage in Ta_2O_5 ," *J Solid State Chem*, **9**, 9, 1993
- Wagner T.; O'Keffe, M.: Bond Lengths and Angles in Aluminates with the Magnetoplumbite and β -Alumina Structures," *J Solid State Chem*, **9**, 3, 21-26
- Wagner T.; O'Keffe, M.: A Structural Model for Bismuth Hexagallate," *J Solid State Chem*, **9**, 3, 1993
- Wagner, T.; O'Keffe, M.: Electron Microscopy of Defects and Disorder in Bismuth Hexagallate," *Acta Cryst.*, **9**, 3, 1081-12

d. Synergistic Activities:

Since joining the chemistry department at YSU, Tim has focused much effort on establishing a departmental infrastructure for solid state structural analysis. He played the lead role in establishing the department's existing X-ray facility (as the PI on the DREIRI grant). He also set-up the department's transmission electron microscope laboratory by locating two donor instruments and combining them into one functional instrument. He is a major proponent of the department's policy regarding hands-on access to research-grade instrumentation by any undergraduate student who desires training. Tim has worked on X-ray (both powder & single crystal) diffraction projects with high school students completing projects for science fairs; with general chemistry students doing hands-on experimental honors projects, and with both undergraduate and graduate research students. He has incorporated hands-on X-ray diffraction analysis as a mandatory part of his inorganic laboratory course, and has also worked with students in other courses (e.g. Physical Chemistry Laboratory) doing independent studies in X-ray analysis. Tim has also served as a consultant with industrial scientists and other external users needing X-ray diffraction data.

He currently has an active research grant funded by Research Corporation, which has supported four undergraduate research students during the past two summers. Results from part of this project are currently being prepared for publication. He recently, Tim has focused his efforts on the general chemistry curriculum, and is the PI on a successful NSF-CCL grant which will be used to incorporate computer technology into the general chemistry laboratory.

e. Collaborators and Affiliations:

i) Collaborators:

Casey Raymond, Kent State University

ii) Graduate and Post Doctoral Advisors:

Mhael O'Keefe (PhD) Arizona State University

Lawrence Mks Post. Doc.) Northwestern University

iii) Thesis and Postgraduate Scholar Sponsor:

Ben Amad, M 19 Joseph Potkinicky, M 19 Rhea Nicklow, M 2000. Tim has also served as research advisor for 16 undergraduate students.

SUMMARY PROPOSAL BUDGET YEAR 1

ORGANIZATION Youngstown State University				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Daryl W Mincey				AWARD NO.	Proposed	Granted	
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-mos.		Funds Requested By proposer	Funds granted by NSF (if different)
	CAL	ACAD	SUMR				
1. Daryl W Mincey - PI & Project Director	0.00	0.00	0.00	\$	0	\$	
2. Allen D Hunter - Co-PI	0.00	0.00	0.00		0		
3. John A Jackson - Co-PI	0.00	0.00	0.00		0		
4. Sherri R Lovelace-Cameron - none	0.00	0.00	0.00		0		
5. Timothy R Wagner - Co-PI	0.00	0.00	0.00		0		
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0		
7. (5) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0		
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. (0) POST DOCTORAL ASSOCIATES	0.00	0.00	0.00		0		
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00		0		
3. (0) GRADUATE STUDENTS					0		
4. (12) UNDERGRADUATE STUDENTS					0		
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0		
6. (6) OTHER					0		
TOTAL SALARIES AND WAGES (A + B)					0		
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					0		
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					0		
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT					0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)					0		
2. FOREIGN					0		
F. PARTICIPANT SUPPORT COSTS							
1. STIPENDS \$		65,000					
2. TRAVEL		6,000					
3. SUBSISTENCE		0					
4. OTHER		0					
TOTAL NUMBER OF PARTICIPANTS (15)				TOTAL PARTICIPANT COSTS	71,000		
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES					0		
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION					0		
3. CONSULTANT SERVICES					0		
4. COMPUTER SERVICES					0		
5. SUBAWARDS					0		
6. OTHER					0		
TOTAL OTHER DIRECT COSTS					0		
H. TOTAL DIRECT COSTS (A THROUGH G)					71,000		
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) Participant Stipend (Rate: 25.0000, Base: 65000)							
TOTAL INDIRECT COSTS (F&A)					16,250		
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)					87,250		
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.D.7.j.)					0		
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				\$	87,250	\$	
M. COST SHARING PROPOSED LEVEL \$ 28,227				AGREED LEVEL IF DIFFERENT \$			
PI / PD TYPED NAME & SIGNATURE* Daryl W Mincey			DATE	FOR NSF USE ONLY			
ORG. REP. TYPED NAME & SIGNATURE*			DATE	INDIRECT COST RATE VERIFICATION			
				Date Checked	Date Of Rate Sheet	Initials - ORG	

SUMMARY PROPOSAL BUDGET YEAR 2

ORGANIZATION Youngstown State University				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Daryl W Mincey				AWARD NO.	Proposed	Granted	
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-mos.		Funds Requested By proposer	Funds granted by NSF (if different)
	CAL	ACAD	SUMR				
1. Daryl W Mincey - PI & Project Director	0.00	0.00	0.00	\$	0	\$	
2. Allen D Hunter - Co-PI	0.00	0.00	0.00		0		
3. John A Jackson - Co-PI	0.00	0.00	0.00		0		
4. Sherri R Lovelace-Cameron - none	0.00	0.00	0.00		0		
5. Timothy R Wagner - Co-PI	0.00	0.00	0.00		0		
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0		
7. (5) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0		
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. (0) POST DOCTORAL ASSOCIATES	0.00	0.00	0.00		0		
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00		0		
3. (0) GRADUATE STUDENTS					0		
4. (12) UNDERGRADUATE STUDENTS					0		
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0		
6. (6) OTHER					0		
TOTAL SALARIES AND WAGES (A + B)					0		
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					0		
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					0		
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT					0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)					0		
2. FOREIGN					0		
F. PARTICIPANT SUPPORT COSTS							
1. STIPENDS \$			65,000				
2. TRAVEL			6,000				
3. SUBSISTENCE			0				
4. OTHER			0				
TOTAL NUMBER OF PARTICIPANTS (15)				TOTAL PARTICIPANT COSTS	71,000		
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES					0		
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION					0		
3. CONSULTANT SERVICES					0		
4. COMPUTER SERVICES					0		
5. SUBAWARDS					0		
6. OTHER					0		
TOTAL OTHER DIRECT COSTS					0		
H. TOTAL DIRECT COSTS (A THROUGH G)					71,000		
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) Participant Stipend (Rate: 25.0000, Base: 65000)							
TOTAL INDIRECT COSTS (F&A)					16,250		
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)					87,250		
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.D.7.j.)					0		
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				\$	87,250	\$	
M. COST SHARING PROPOSED LEVEL \$ 28,227				AGREED LEVEL IF DIFFERENT \$			
PI / PD TYPED NAME & SIGNATURE* Daryl W Mincey			DATE	FOR NSF USE ONLY			
ORG. REP. TYPED NAME & SIGNATURE*			DATE	INDIRECT COST RATE VERIFICATION			
				Date Checked	Date Of Rate Sheet	Initials - ORG	

SUMMARY PROPOSAL BUDGET YEAR 3

ORGANIZATION Youngstown State University				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Daryl W Mincey				AWARD NO.	Proposed	Granted	
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-mos.		Funds Requested By proposer	Funds granted by NSF (if different)
	CAL	ACAD	SUMR				
1. Daryl W Mincey - PI & Project Director	0.00	0.00	0.00	\$	0	\$	
2. Allen D Hunter - Co-PI	0.00	0.00	0.00		0		
3. John A Jackson - Co-PI	0.00	0.00	0.00		0		
4. Sherri R Lovelace-Cameron - none	0.00	0.00	0.00		0		
5. Timothy R Wagner - Co-PI	0.00	0.00	0.00		0		
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0		
7. (5) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00		0		
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. (0) POST DOCTORAL ASSOCIATES	0.00	0.00	0.00		0		
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00		0		
3. (0) GRADUATE STUDENTS					0		
4. (12) UNDERGRADUATE STUDENTS					0		
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0		
6. (6) OTHER					0		
TOTAL SALARIES AND WAGES (A + B)					0		
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					0		
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					0		
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT					0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)					0		
2. FOREIGN					0		
F. PARTICIPANT SUPPORT COSTS							
1. STIPENDS \$ _____					65,000		
2. TRAVEL _____					6,000		
3. SUBSISTENCE _____					0		
4. OTHER _____					0		
TOTAL NUMBER OF PARTICIPANTS (15)				TOTAL PARTICIPANT COSTS	71,000		
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES					0		
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION					0		
3. CONSULTANT SERVICES					0		
4. COMPUTER SERVICES					0		
5. SUBAWARDS					0		
6. OTHER					0		
TOTAL OTHER DIRECT COSTS					0		
H. TOTAL DIRECT COSTS (A THROUGH G)					71,000		
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) Participant Stipend (Rate: 25.0000, Base: 65000)							
TOTAL INDIRECT COSTS (F&A)					16,250		
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)					87,250		
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.D.7.j.)					0		
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				\$	87,250	\$	
M. COST SHARING PROPOSED LEVEL \$ 28,227				AGREED LEVEL IF DIFFERENT \$			
PI / PD TYPED NAME & SIGNATURE* Daryl W Mincey			DATE	FOR NSF USE ONLY			
ORG. REP. TYPED NAME & SIGNATURE*			DATE	INDIRECT COST RATE VERIFICATION			
				Date Checked	Date Of Rate Sheet	Initials - ORG	

SUMMARY PROPOSAL BUDGET

Cumulative

ORGANIZATION Youngstown State University				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Daryl W Mincey				AWARD NO.	Proposed	Granted	
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-mos.		Funds Requested By proposer	Funds granted by NSF (if different)
	CAL	ACAD	SUMR				
1. Daryl W Mincey - PI & Project Director	0.00	0.00	0.00	\$ 0		\$ 0	
2. Allen D Hunter - Co-PI	0.00	0.00	0.00			0	
3. John A Jackson - Co-PI	0.00	0.00	0.00			0	
4. Sherri R Lovelace-Cameron - none	0.00	0.00	0.00			0	
5. Timothy R Wagner - Co-PI	0.00	0.00	0.00			0	
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00			0	
7. (5) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.00	0.00			0	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. (0) POST DOCTORAL ASSOCIATES	0.00	0.00	0.00			0	
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00			0	
3. (0) GRADUATE STUDENTS						0	
4. (36) UNDERGRADUATE STUDENTS						0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)						0	
6. (18) OTHER						0	
TOTAL SALARIES AND WAGES (A + B)						0	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)						0	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)						0	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT						0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)						0	
2. FOREIGN						0	
F. PARTICIPANT SUPPORT COSTS							
1. STIPENDS \$		195,000					
2. TRAVEL		18,000					
3. SUBSISTENCE		0					
4. OTHER		0					
TOTAL NUMBER OF PARTICIPANTS (45)				TOTAL PARTICIPANT COSTS		213,000	
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES						0	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION						0	
3. CONSULTANT SERVICES						0	
4. COMPUTER SERVICES						0	
5. SUBAWARDS						0	
6. OTHER						0	
TOTAL OTHER DIRECT COSTS						0	
H. TOTAL DIRECT COSTS (A THROUGH G)						213,000	
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)							
TOTAL INDIRECT COSTS (F&A)						48,750	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)						261,750	
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.D.7.j.)						0	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)						\$ 261,750 \$	
M. COST SHARING PROPOSED LEVEL \$ 84,681				AGREED LEVEL IF DIFFERENT \$			
PI / PD TYPED NAME & SIGNATURE* Daryl W Mincey			DATE	FOR NSF USE ONLY			
ORG. REP. TYPED NAME & SIGNATURE*			DATE	INDIRECT COST RATE VERIFICATION			
				Date Checked	Date Of Rate Sheet	Initials - ORG	

F. Budget Justification

F.F. Participant Support Costs:

F.F1 Ten undergraduate researchers will be provided with a stipend of \$500 to support room and board (\$60), transportation (\$), parking (\$) and incidental expenses. Five professors from the four-year institutions served will be provided with \$500 stipend to support travel, meals, overnight stays, supplies, and other incidental costs.

F.F2 A \$0 amount will be reserved for each student to present the results of their work at a regional or national conference.

I Indirect Costs were calculated at % of \$,000 in stipends for a total of \$500. This is 1% lower than our normal indirect cost of %

M The average cost of tuition and general fees of \$ per year for ten student participants will be covered by Graduate Studies and Research. A sum of \$0 will be provided for each participant to cover supplies for a total of \$50 per year. Following current YSU instrumentation policy, PUI users of the instrumentation facility will not be charged for instrument use in undergraduate teaching (unless large volumes of consumables such as liquid nitrogen are used) High volume research users will be asked to request a nominal amount (\$-100 per data set) from external granting agencies but these fees will be waived for occasional users and for those without external grant support. Instrument time will be available on a first come first served basis with undergraduate research projects having the highest research priority (and will be schedulable up to several weeks in advance) All participating institutions, including YSU, will have the same priority for access. The estimated value of this service, which will be available throughout the year and not just during the summer, is \$300. The university expenditure for instrumentation over the last five years is \$,60,000. Approximately \$0,000 is currently being held to match several outstanding major instrumentation proposals.

MCost Sharing:

	Item to be Supported	Amount Asked From NSF	Funds From Non-Federal Sources	Total Cost of Item
F1	Student Stipends	\$5000	\$	\$5000
F1	College Faculty	\$,000	\$	\$,000
F2	Student Travel	\$800	\$	\$800
H.	Total Direct Costs	\$3000	\$	\$3000
I.	Total Indirect Costs	\$	\$	\$
K	Amount Requested	\$,5	\$	\$,5
	Institution matched		\$	
	Total			\$

Current and Pending Support

See Section ID.8 for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information			
Investigator: Daryl W. Mincey, PI Project Director	Other agencies (including NSF) to which this proposal has been/will be NSF-CCLI (70% proposal overlap)		
Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	Project/Proposal Title: Integration of Non-Traditional Analytical Techniques into Traditional And Non-Traditional Instrumentation Courses		
Source of Support: NSF-DUE-CCLI-A&I			
Total Award Amount: \$199,834 to YSU		Total Award Period Covered: 10/01/2000 – 09/31/2002	
Location of Project: Youngstown State University			
Person-Months Per Year Committed to the Project.	Cal: 0.5	Acad:	Sumr:
Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	Project/Proposal Title: Integration of Materials Characterization Throughout the Chemistry and Physics Curricula: Purchase of Thermal Analysis, Viscometry, and Gel Permeation/Size Exclusion Chromatography Equipment		
Source of Support: NSF-DUE-ILI #9851107			
Total Award Amount: \$44,600		Total Award Period Covered: 06/01/1998 – 05/31/2001	
Location of Project: Youngstown State University			
Person-Months Per Year Committed to the Project.	for 2000-01 Cal: .2	Acad:	Sumr:
Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	Project/Proposal Title: A Proposal to Establish a State-of-the-Art Ohio Mass Spectrometry Consortium \$3,200,000 to a consortium of 8 Ohio Universities Funding for a LC-MS at YSU + other shared instrumentation		
Source of Support: Ohio Board of Regents Investment Fund			
Total Award Amount: \$1,200,000 to YSU		Total Award Period Covered: 06/01/1999 – 05/31/2000	
Location of Project: Youngstown State University and other 7 Ohio Universities			
Person-Months Per Year Committed to the Project.	Cal: 0.25	Acad:	Sumr:
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	Project/Proposal Title:		
Source of Support:			
Total Award Amount: \$		Total Award Period Covered:	
Location of Project:			
Person-Months Per Year Committed to the	Cal:	Acad:	Sumr:
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	Project/Proposal Title:		
Source of Support:			
Total Award Amount: \$		Total Award Period Covered:	
Location of Project:			
Person-Months Per Year Committed to the	Cal:	Acad:	Sumr:
*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.			

Current and Pending Support

See Section ID.8 for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this						
Investigator: Mhael A. Serra, Co-PI				Other agencies (including NSF) to which this proposal has been/will		
Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support						
Project/Proposal Title: Lysozyme as a model protein to investigate the site-specific nature of polypeptide fragmentation using MCO systems						
Source of Support: Research Corporation						
Total Award Amount: \$35,000			Total Award Period Covered: 07/01/98 – 06/30/01			
Location of Project: Youngstown State University						
Person-Months		Per Year Committed to the		Cal:	Acad:	Sumr:
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support						
Project/Proposal Title:						
Source of Support:						
Total Award Amount: \$			Total Award Period Covered:			
Location of Project:						
Person-Months		Per Year Committed to the		Cal:	Acad:	Sumr:
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support						
Project/Proposal Title:						
Source of Support:						
Total Award Amount: \$			Total Award Period Covered:			
Location of Project:						
Person-Months		Per Year Committed to the		Cal:	Acad:	Sumr:
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support						
Project/Proposal Title:						
Source of Support:						
Total Award Amount: \$			Total Award Period Covered:			
Location of Project:						
Person-Months		Per Year Committed to the		Cal:	Acad:	Sumr:
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support						
Project/Proposal Title:						
Source of Support:						
Total Award Amount: \$			Total Award Period Covered:			
Location of Project:						
Person-Months		Per Year Committed to the		Cal:	Acad:	Sumr:
*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.						

Current and Pending Support**See Section ID.8 for guidance on information to include on this form.)**

The following information should be provided for each investigator and other senior personnel. Failure to provide this information			
Investigator: Allen D. Hunter	Other agencies (including NSF) to which this proposal has been/will be NSF-DUE-CCLI-A&I (60% proposal overlap)		
Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	Project/Proposal Title: X-Ray Diffraction Analysis Throughout the Curriculum: a Powerful Tool for Understanding Molecular Structure and Bonding		
Source of Support: NSF-DUE-CCLI-EMD-POC # 9980921			
Total Award Amount: \$74,707		Total Award Period Covered: 05/01/2000 – 04/30/2002	
Location of Project: Youngstown State University			
Person-Months Per Year Committed to the Project.	Cal:	Acad: 3	Sumr: 1
Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	Project/Proposal Title: The Ohio Project for Science Teaching		
Source of Support: Ohio Board of Regents			
Total Award Amount: \$4,000 to YSU		Total Award Period Covered: 07/01/1999 – 06/30/2000	
Location of Project: Youngstown State University and other Ohio Universities			
Person-Months Per Year Committed to the Project.	Cal: 0.5	Acad:	Sumr:
Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	Project/Proposal Title: A Proposal to Establish a State-of-the-Art Ohio Mass Spectrometry Consortium \$1,860,000 to a consortium of 8 Ohio Universities Funding for a LC-MS at YSU + other shared instrumentation		
Source of Support: Ohio Board of Regents Investment Fund			
Total Award Amount: \$88,900 to YSU		Total Award Period Covered: 06/01/1999 – 05/31/2000	
Location of Project: Youngstown State University and other 7 Ohio Universities			
Person-Months Per Year Committed to the Project.	Cal: 0.5	Acad:	Sumr:
Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	Project/Proposal Title: Investigative Approaches in the Natural Sciences		
Source of Support: NSF-DUE-IWR #9850079			
Total Award Amount: \$183,579		Total Award Period Covered: 06/01/1998 – 05/31/2001	
Location of Project: Youngstown State University			
Person-Months Per Year Committed to the Project.	Cal: 0.1	Acad:	Sumr:
Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	Project/Proposal Title: Integration of Materials Characterization Throughout the Chemistry and Physics Curricula: Purchase of Thermal Analysis, Viscometry, and Gel Permeation/Size Exclusion Chromatography Equipment		
Source of Support: NSF-DUE-ILI #9851107			
Total Award Amount: \$44,600		Total Award Period Covered: 06/01/1998 – 05/31/2001	
Location of Project: Youngstown State University			
Person-Months Per Year Committed to the Project.	for 2000-01	Cal: 1 in 2000	Acad: Sumr:
*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.			

Current and Pending Support**See Section ID. for guidance on information to include on this form.)**

The following information should be provided for each investigator and other senior personnel. Failure to provide this information			
Investigator: Allen D. Hunter , (continued)		Other agencies (including NSF) to which this proposal has been/will be	
Support:	<input checked="" type="checkbox"/> Current	<input type="checkbox"/> Pending	<input type="checkbox"/> Submission Planned in Near Future
Project/Proposal Title: A Proposal for Fulfilling the Goals of the Oho Mass Spectrometry Consortium Funding for consortial MS instruments including a high resolution ICP-MS			
Source of Support: Ohio Board of Regents Investment Fund			
Total Award Amount: \$500,000 to Consortium Total Award Period Covered: 06/01/2000 – 05/31/2001			
Location of Project: YSU and 7 other Ohio Universities			
Person-Months Per Year Committed to the Project. no additional Cal: Acad: Sumr:			
Support:	<input type="checkbox"/> Current	<input checked="" type="checkbox"/> Pending	<input type="checkbox"/> Submission Planned in Near Future
Project/Proposal Title: RUI- Cooperative Research Project – Structural Investigations of Main Group Heterocyclic Rings and Cages			
Source of Support: NSF-International Division-Western Europe			
Total Award Amount: \$15,460 Total Award Period Covered: 12/01/2000 – 12/31/2000			
Location of Project: St. Andrews University (Scotland) and Youngstown State University			
Person-Months Per Year Committed to the Project. Cal: Acad: 7 Sumr:			
Support:	<input type="checkbox"/> Current	<input type="checkbox"/> Pending	<input checked="" type="checkbox"/> Submission Planned in Near Future
Project/Proposal Title: Investigative Approaches in Advanced Synthesis Laboratories: Inorganic, Organic, and Polymeric Materials			
Source of Support: NSF-DUE-CCLI-A&I			
Total Award Amount: \$ ≈70,000 Total Award Period Covered: 01/01/2001 – 12/31/2003			
Location of Project: Youngstown State University			
Person-Months Per Year Committed to the Project. Cal: 1.5 Acad: Sumr:			
Support:	<input type="checkbox"/> Current	<input checked="" type="checkbox"/> Pending	<input type="checkbox"/> Submission Planned in Near Future
Project/Proposal Title: State Matching Funds for the WEB Accessible Diffraction Facility (contingent on receiving this CCLI grant, ≈60% overlap with this CCLI grant)			
Source of Support: Ohio Board of Regents Action Fund			
Total Award Amount: \$75,000 Total Award Period Covered: 01/01/2001 - 12/31/2001			
Location of Project: Youngstown State University			
Person-Months Per Year Committed to the Project. no extra Cal: Acad: Sumr:			
Support:	<input type="checkbox"/> Current	<input checked="" type="checkbox"/> Pending	<input type="checkbox"/> Submission Planned in Near Future
Project/Proposal Title: WEB Accessible Single Crystal X-Ray Diffractometer for Undergraduate Instruction at a Consortium of Predominantly Undergraduate Institutions (≈60% overlap with this CRIF Proposal)			
Source of Support: NSF-DUE-CCLI-A&I			
Total Award Amount: \$ 260,000 Total Award Period Covered: 01/01/2001 – 12/31/2003			
Location of Project: Youngstown State University and a Consortium of 22 other Predominantly Undergraduate Institutions			
Person-Months Per Year Committed to the Project. Cal: 3 Acad: Sumr:			
*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.			

Current and Pending Support

See Section ID. for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may result in disqualification of the proposal.			
Investigator: Allen D. Hnter (continued)		Other agencies (including NSF) to which this proposal has been/will be submitted:	
Support:	<input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	Project/Proposal Title: Diffraction Methods in the Undergraduate Curriculum & in Undergraduate Research	
Source of Support: Dreyfus Foundation: Scholar/Fellow Program for Undergraduate Institutions			
Total Award Amount: \$ 65,000		Total Award Period Covered: 07/15/2001 – 07/14/2003	
Location of Project: Youngstown State University			
Person-Months Per Year Committed to the Project.	Cal: 0.5	Acad:	Sumr:
Support:	<input type="checkbox"/> Current <input type="checkbox"/> Pending <input checked="" type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	Project/Proposal Title: RUI - Advanced Synthesis Instrumentation	
Source of Support: NSF-CRIF/MRI + Ohio Board of Regents Action Fund Match			
Total Award Amount: \$228,000 + \$74,000		Total Award Period Covered: 08/01/01-31/7/04	
Location of Project: Youngstown State University			
Person-Months Per Year Committed to the Project.	Cal: 0.5	Acad:	Sumr:
Support:	<input type="checkbox"/> Current <input type="checkbox"/> Pending <input checked="" type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	Project/Proposal Title: IGERT - CWRU/YSU Collaborative Graduate Program for In-Service Teachers: Fusing Chemistry, Allied Sciences, and Science Education	
Source of Support: NSF-IGERT program, Pre-proposal			
Total Award Amount: \$2,658,442		Total Award Period Covered: 05/01/01-04/30/06	
Location of Project: Youngstown State University and Case Western Reserve University			
Person-Months Per Year Committed to the Project.	Cal: 1	Acad:	Sumr:
Support:	<input type="checkbox"/> Current <input type="checkbox"/> Pending <input checked="" type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	Project/Proposal Title: IGERT - Cooperative Graduate Program in Synthetic and Structural Biological Chemistry	
Source of Support: NSF-IGERT program, Pre-proposal			
Total Award Amount: \$2,622,562		Total Award Period Covered: 05/01/01-04/30/06	
Location of Project: Youngstown State University and Ohio State University			
Person-Months Per Year Committed to the Project.	Cal: 1	Acad:	Sumr:
Support:	<input type="checkbox"/> Current <input type="checkbox"/> Pending <input checked="" type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	Project/Proposal Title: IGERT - Interdisciplinary Graduate Training Program in Biomolecular Science	
Source of Support: NSF-IGERT program, Pre-proposal			
Total Award Amount: \$2,657,600		Total Award Period Covered: 05/01/01-04/30/06	
Location of Project: Youngstown State University and University of Cincinnati			
Person-Months Per Year Committed to the Project.	Cal: 1	Acad:	Sumr:
*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.			

Current and Pending Support

See Section ID.8 for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may result in the proposal being considered incomplete.						
Investigator: Allen D. Hunter (continued)				Other agencies (including NSF) to which this proposal has been/will be submitted:		
Support:	<input type="checkbox"/> Current	<input type="checkbox"/> Pending	<input checked="" type="checkbox"/> Submission Planned in Near Future	<input type="checkbox"/> *Transfer of Support		
Project/Proposal Title: IGERT - Graduate Education for Leadership in a Changing Career: Interdisciplinary Research on the Synthesis and Spectroscopic Characterization of Macromolecular Structures						
Source of Support: NSF-IGERT program, Pre-proposal						
Total Award Amount: \$2,699,999			Total Award Period Covered: 05/01/01-04/30/06			
Location of Project: Youngstown State University and University of Akron						
Person-Months	Per Year	Committed to the	Cal: 1	Acad:	Sumr:	
Support:	<input type="checkbox"/> Current	<input type="checkbox"/> Pending	<input type="checkbox"/> Submission Planned in Near Future	<input type="checkbox"/> *Transfer of Support		
Project/Proposal Title:						
Source of Support:						
Total Award Amount: \$			Total Award Period Covered:			
Location of Project:						
Person-Months	Per Year	Committed to the	Cal:	Acad:	Sumr:	
Support:	<input type="checkbox"/> Current	<input type="checkbox"/> Pending	<input type="checkbox"/> Submission Planned in Near Future	<input type="checkbox"/> *Transfer of Support		
Project/Proposal Title:						
Source of Support:						
Total Award Amount: \$			Total Award Period Covered:			
Location of Project:						
Person-Months	Per Year	Committed to the	Cal:	Acad:	Sumr:	
Support:	<input type="checkbox"/> Current	<input type="checkbox"/> Pending	<input type="checkbox"/> Submission Planned in Near Future	<input type="checkbox"/> *Transfer of Support		
Project/Proposal Title:						
Source of Support:						
Total Award Amount: \$			Total Award Period Covered:			
Location of Project:						
Person-Months	Per Year	Committed to the	Cal:	Acad:	Sumr:	
Support:	<input type="checkbox"/> Current	<input type="checkbox"/> Pending	<input type="checkbox"/> Submission Planned in Near Future	<input type="checkbox"/> *Transfer of Support		
Project/Proposal Title:						
Source of Support:						
Total Award Amount: \$			Total Award Period Covered:			
Location of Project:						
Person-Months	Per Year	Committed to the	Cal:	Acad:	Sumr:	
*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.						

Current and Pending Support
See Section ID.8 for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this			
Investigator: Sherril Lovelace Cameron	Other agencies (including NSF) to which this proposal has been/will		
Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	Project/Proposal Title: Investigative Approaches in the Natural Sciences		
Source of Support: NSF-DUE-IWR #9850079			
Total Award Amount: \$183,579		Total Award Period Covered: 06/01/1998 – 05/31/2001	
Location of Project: Youngstown State University			
Person-Months Per Year Committed to the Project.	Cal:	Acad: 2.0	Sumr: 1.0
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input checked="" type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	Project/Proposal Title: Investigative Approaches in Advanced Synthesis Laboratories: Inorganic, Organic, and Polymeric Materials		
Source of Support: NSF-DUE-CCLI-A&I			
Total Award Amount: \$ ≈70,000		Total Award Period Covered: 01/01/2001 – 12/31/2003	
Location of Project: Youngstown State University			
Person-Months Per Year Committed to the Project.	Cal: 2.0	Acad:	Sumr:
Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	Project/Proposal Title: What is a Scientist?		
Source of Support: NSF-EHR #0086332			
Total Award Amount: \$99,914		Total Award Period Covered: 10/01/2000 - 03/30/2002	
Location of Project: Youngstown State University			
Person-Months Per Year Committed to the	Cal:	Acad:	Sumr: 0.5
Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	Project/Proposal Title: WEB Accessible Single Crystal X-Ray Diffractometer for Undergraduate Instruction at a Consortium of Predominantly Undergraduate Institutions (≈60% overlap with this CRIF Proposal)		
Source of Support: NSF-DUE-CCLI-A&I			
Total Award Amount: \$ 260,000		Total Award Period Covered: 01/01/2001 – 12/31/2003	
Location of Project: Youngstown State University and a Consortium of 22 other Predominantly Undergraduate Institutions			
Person-Months Per Year Committed to the Project.	Cal: 2	Acad:	Sumr:
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input checked="" type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	Project/Proposal Title: RUI - Advanced Synthesis Instrumentation		
Source of Support: NSF-CRIF/MRI + Ohio Board of Regents Action Fund Match			
Total Award Amount: \$228,000 + \$74,000		Total Award Period Covered: 08/01/01-31/7/04	
Location of Project: Youngstown State University			
Person-Months Per Year Committed to the	Cal: 0.5	Acad:	Sumr:
*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.			

Current and Pending Support
See Section ID.8 for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this			
Investigator: Sherril Lovelace Cameron	Other agencies (including NSF) to which this proposal has been/will continued		
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input checked="" type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	Project/Proposal Title: IGERT - CWRU/YSU Collaborative Graduate Program for In-Service Teachers: Fusing Chemistry, Allied Sciences, and Science Education		
Source of Support: NSF-IGERT program, Pre-proposal			
Total Award Amount: \$2,658,442		Total Award Period Covered: 05/01/01-04/30/06	
Location of Project: Youngstown State University and Case Western Reserve University			
Person-Months	Per Year	Committed to the	Cal: 1 Acad: Sumr:
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input checked="" type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	Project/Proposal Title: IGERT - Cooperative Graduate Program in Synthetic and Structural Biological Chemistry		
Source of Support: NSF-IGERT program, Pre-proposal			
Total Award Amount: \$2,622,562		Total Award Period Covered: 05/01/01-04/30/06	
Location of Project: Youngstown State University and Ohio State University			
Person-Months	Per Year	Committed to the	Cal: 1 Acad: Sumr:
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input checked="" type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	Project/Proposal Title: IGERT - Interdisciplinary Graduate Training Program in Biomolecular Science		
Source of Support: NSF-IGERT program, Pre-proposal			
Total Award Amount: \$2,657,600		Total Award Period Covered: 05/01/01-04/30/06	
Location of Project: Youngstown State University and University of Cincinnati			
Person-Months	Per Year	Committed to the	Cal: 1 Acad: Sumr:
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input checked="" type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	Project/Proposal Title: IGERT - Graduate Education for Leadership in a Changing Career: Interdisciplinary Research on the Synthesis and Spectroscopic Characterization of Macromolecular Structures		
Source of Support: NSF-IGERT program, Pre-proposal			
Total Award Amount: \$2,699,999		Total Award Period Covered: 05/01/01-04/30/06	
Location of Project: Youngstown State University and University of Akron			
Person-Months	Per Year	Committed to the	Cal: 1 Acad: Sumr:
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	Project/Proposal Title:		
Source of Support:			
Total Award Amount: \$		Total Award Period Covered:	
Location of Project:			
Person-Months	Per Year	Committed to the	Cal: Acad: Sumr:
*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.			

Current and Pending Support
See Section ID.8 for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this			
Investigator: Stacey Lowery Bretz	Other agencies (including NSF) to which this proposal has been/will		
Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	Project/Proposal Title: X-Ray Diffraction Analysis Throughout the Curriculum: a Powerful Tool for Understanding Molecular Structure and Bonding		
Source of Support: NSF-DUE-CCLI-EMD-POC # 9980921			
Total Award Amount: \$74,707		Total Award Period Covered: 05/01/2000 – 04/30/2002	
Location of Project: Youngstown State University			
Person-Months Per Year Committed to the Project.	Cal:	Acad: 1	Sumr: 0.5
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input checked="" type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	Project/Proposal Title: Investigative Approaches in Advanced Synthesis Laboratories: Inorganic, Organic, and Polymeric Materials		
Source of Support: NSF-DUE-CCLI-A&I			
Total Award Amount: \$ ≈70,000		Total Award Period Covered: 01/01/2001 – 12/31/2003	
Location of Project: Youngstown State University			
Person-Months Per Year Committed to the Project.	Cal: 1.0	Acad:	Sumr:
Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	Project/Proposal Title: WEB Accessible Single Crystal X-Ray Diffractometer for Undergraduate Instruction at a Consortium of Predominantly Undergraduate Institutions (≈60% overlap with this CRIF Proposal)		
Source of Support: NSF-DUE-CCLI-A&I			
Total Award Amount: \$ 260,000		Total Award Period Covered: 01/01/2001 – 12/31/2003	
Location of Project: Youngstown State University and a Consortium of 22 other Predominantly Undergraduate Institutions			
Person-Months Per Year Committed to the Project.	Cal: 2	Acad:	Sumr:
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input checked="" type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	Project/Proposal Title: IGERT - CWRU/YSU Collaborative Graduate Program for In-Service Teachers: Fusing Chemistry, Allied Sciences, and Science Education		
Source of Support: NSF-IGERT program, Pre-proposal			
Total Award Amount: \$2,658,442		Total Award Period Covered: 05/01/01-04/30/06	
Location of Project: Youngstown State University and Case Western Reserve University			
Person-Months Per Year Committed to the	Cal: 1	Acad:	Sumr:
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	Project/Proposal Title:		
Source of Support:			
Total Award Amount: \$		Total Award Period Covered:	
Location of Project:			
Person-Months Per Year Committed to the	Cal:	Acad:	Sumr:
*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.			

Current and Pending Support**See Section ID.8 for guidance on information to include on this form.)**

The following information should be provided for each investigator and other senior personnel. Failure to provide this			
Investigator: Imothy R. Wagner , continued		Other agencies (including NSF) to which this proposal has been/will	
Support:	<input checked="" type="checkbox"/> Current	<input type="checkbox"/> Pending	<input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support
Project/Proposal Title: Integration of Computer Technology into the General Chemistry Curriculum			
Source of Support: NSF-DUE-CCLI-A&I			
Total Award Amount: \$94,945		Total Award Period Covered: 07/01/2000 - 06/30/2002	
Location of Project: Youngstown State University			
Person-Months Per Year Committed to the	year 1 only	Cal:	Acad: 1.5 Sumr: 1.5
Support:	<input checked="" type="checkbox"/> Current	<input type="checkbox"/> Pending	<input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support
Project/Proposal Title: Integration of Materials Characterization Throughout the Chemistry and Physics Curricula: Purchase of Thermal Analysis, Viscometry, and Gel Permeation/Size Exclusion Chromatography Equipment			
Source of Support: NSF-DUE-ILI #9851107			
Total Award Amount: \$44,600		Total Award Period Covered: 06/01/1998 – 05/31/2001	
Location of Project: Youngstown State University			
Person-Months Per Year Committed to the Project.		Cal:	Acad: 0.5 Sumr:
Support:	<input checked="" type="checkbox"/> Current	<input type="checkbox"/> Pending	<input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support
Project/Proposal Title: Synthesis and X-Ray Structure Characterizations of Nitride-Fluoride Analogs to Metal Oxides			
Source of Support: Research Corporation Cottrell Grant			
Total Award Amount: \$39,719		Total Award Period Covered: 05/15/1999 - 05/14/20001	
Location of Project: Youngstown State University			
Person-Months Per Year Committed to the		Cal:	Acad: 3 Sumr: 2
Support:	<input type="checkbox"/> Current	<input checked="" type="checkbox"/> Pending	<input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support
Project/Proposal Title: WEB Accessible Single Crystal X-Ray Diffractometer for Undergraduate Instruction at a Consortium of Predominantly Undergraduate Institutions (≈60% overlap with this CRIF Proposal)			
Source of Support: NSF-DUE-CCLI-A&I			
Total Award Amount: \$ 260,000		Total Award Period Covered: 01/01/2001 – 12/31/2003	
Location of Project: Youngstown State University and a Consortium of 22 other Predominantly Undergraduate Institutions			
Person-Months Per Year Committed to the Project.		Cal: 2	Acad: Sumr:
Support:	<input type="checkbox"/> Current	<input type="checkbox"/> Pending	<input checked="" type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support
Project/Proposal Title: Investigative Approaches in Advanced Synthesis Laboratories: Inorganic, Organic, and Polymeric Materials			
Source of Support: NSF-DUE-CCLI-A&I			
Total Award Amount: \$ ≈70,000		Total Award Period Covered: 01/01/2001 – 12/31/2003	
Location of Project: Youngstown State University			
Person-Months Per Year Committed to the Project.		Cal: 1.0	Acad: Sumr:

*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.

Current and Pending Support

See Section ID.8 for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this						
Investigator: Imothy R. Wagner				Other agencies (including NSF) to which this proposal has been/will		
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input checked="" type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support						
Project/Proposal Title: RUI - Advanced Synthesis Instrumentation						
Source of Support: NSF-CRIF/MRI + Ohio Board of Regents Action Fund Match						
Total Award Amount: \$228,000 + \$74,000 Total Award Period Covered: 08/01/01-31/7/04						
Location of Project: Youngstown State University						
Person-Months	Per Year	Committed to the	Cal: 0.5	Acad:	Sumr:	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support						
Project/Proposal Title:						
Source of Support:						
Total Award Amount: \$ Total Award Period Covered:						
Location of Project:						
Person-Months	Per Year	Committed to the	Cal:	Acad:	Sumr:	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support						
Project/Proposal Title:						
Source of Support:						
Total Award Amount: \$ Total Award Period Covered:						
Location of Project:						
Person-Months	Per Year	Committed to the	Cal:	Acad:	Sumr:	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support						
Project/Proposal Title:						
Source of Support:						
Total Award Amount: \$ Total Award Period Covered:						
Location of Project:						
Person-Months	Per Year	Committed to the	Cal:	Acad:	Sumr:	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support						
Project/Proposal Title:						
Source of Support:						
Total Award Amount: \$ Total Award Period Covered:						
Location of Project:						
Person-Months	Per Year	Committed to the	Cal:	Acad:	Sumr:	
*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.						

Current and Pending Support

See Section ID.8 for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this						
Investigator: Mike Serra				Other agencies (including NSF) to which this proposal has been/will		
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input checked="" type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support						
Project/Proposal Title:						
Source of Support						
Total Award Amount:		Total Award Period Covered:				
Location of Project:						
Person-Months	Per Year	Committed to the	Cal:	Acad:	Sumr:	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input checked="" type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support						
Project/Proposal Title						
Source of Support:						
Total Award Amount:		Total Award Period Covered:				
Location of Project:						
Person-Months	Per Year	Committed to the	Cal:	Acad:	Sumr:	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support						
Project/Proposal Title:						
Source of Support:						
Total Award Amount: \$		Total Award Period Covered:				
Location of Project:						
Person-Months	Per Year	Committed to the	Cal:	Acad:	Sumr:	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support						
Project/Proposal Title:						
Source of Support:						
Total Award Amount: \$		Total Award Period Covered:				
Location of Project:						
Person-Months	Per Year	Committed to the	Cal:	Acad:	Sumr:	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support						
Project/Proposal Title:						
Source of Support:						
Total Award Amount: \$		Total Award Period Covered:				
Location of Project:						
Person-Months	Per Year	Committed to the	Cal:	Acad:	Sumr:	

*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.

Current and Pending Support

See Section ID.8 for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this						
Investigator: Howard Mettee				Other agencies (including NSF) to which this proposal has been/will		
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input checked="" type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support						
Project/Proposal Title:						
Source of Support						
Total Award Amount:			Total Award Period Covered:			
Location of Project:						
Person-Months	Per Year	Committed to the	Cal:	Acad:	Sumr:	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input checked="" type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support						
Project/Proposal Title						
Source of Support:						
Total Award Amount:			Total Award Period Covered:			
Location of Project:						
Person-Months	Per Year	Committed to the	Cal:	Acad:	Sumr:	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support						
Project/Proposal Title:						
Source of Support:						
Total Award Amount: \$			Total Award Period Covered:			
Location of Project:						
Person-Months	Per Year	Committed to the	Cal:	Acad:	Sumr:	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support						
Project/Proposal Title:						
Source of Support:						
Total Award Amount: \$			Total Award Period Covered:			
Location of Project:						
Person-Months	Per Year	Committed to the	Cal:	Acad:	Sumr:	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support						
Project/Proposal Title:						
Source of Support:						
Total Award Amount: \$			Total Award Period Covered:			
Location of Project:						
Person-Months	Per Year	Committed to the	Cal:	Acad:	Sumr:	

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Current and Pending Support

See Section ID.8 for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this						
Investigator: Larry Curtin				Other agencies (including NSF) to which this proposal has been/will		
Support:	<input type="checkbox"/> Current	<input type="checkbox"/> Pending	<input checked="" type="checkbox"/> Submission Planned in Near Future	<input type="checkbox"/> *Transfer of Support		
Project/Proposal Title:						
Source of Support:						
Total Award Amount:			Total Award Period Covered:			
Location of Project:						
Person-Months	Per Year	Committed to the	Cal:	Acad:	Sumr:	
Support:	<input type="checkbox"/> Current	<input type="checkbox"/> Pending	<input checked="" type="checkbox"/> Submission Planned in Near Future	<input type="checkbox"/> *Transfer of Support		
Project/Proposal Title:						
Source of Support:						
Total Award Amount:			Total Award Period Covered:			
Location of Project:						
Person-Months	Per Year	Committed to the	Cal:	Acad:	Sumr:	
Support:	<input type="checkbox"/> Current	<input type="checkbox"/> Pending	<input type="checkbox"/> Submission Planned in Near Future	<input type="checkbox"/> *Transfer of Support		
Project/Proposal Title:						
Source of Support:						
Total Award Amount: \$			Total Award Period Covered:			
Location of Project:						
Person-Months	Per Year	Committed to the	Cal:	Acad:	Sumr:	
Support:	<input type="checkbox"/> Current	<input type="checkbox"/> Pending	<input type="checkbox"/> Submission Planned in Near Future	<input type="checkbox"/> *Transfer of Support		
Project/Proposal Title:						
Source of Support:						
Total Award Amount: \$			Total Award Period Covered:			
Location of Project:						
Person-Months	Per Year	Committed to the	Cal:	Acad:	Sumr:	
Support:	<input type="checkbox"/> Current	<input type="checkbox"/> Pending	<input type="checkbox"/> Submission Planned in Near Future	<input type="checkbox"/> *Transfer of Support		
Project/Proposal Title:						
Source of Support:						
Total Award Amount: \$			Total Award Period Covered:			
Location of Project:						
Person-Months	Per Year	Committed to the	Cal:	Acad:	Sumr:	

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Current and Pending Support

See Section ID.8 for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this						
Investigator: John Jackson				Other agencies (including NSF) to which this proposal has been/will		
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input checked="" type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support						
Project/Proposal Title:						
Source of Support						
Total Award Amount:			Total Award Period Covered:			
Location of Project:						
Person-Months	Per Year	Committed to the	Cal:	Acad:	Sumr:	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input checked="" type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support						
Project/Proposal Title						
Source of Support:						
Total Award Amount:			Total Award Period Covered:			
Location of Project:						
Person-Months	Per Year	Committed to the	Cal:	Acad:	Sumr:	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support						
Project/Proposal Title:						
Source of Support:						
Total Award Amount: \$			Total Award Period Covered:			
Location of Project:						
Person-Months	Per Year	Committed to the	Cal:	Acad:	Sumr:	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support						
Project/Proposal Title:						
Source of Support:						
Total Award Amount: \$			Total Award Period Covered:			
Location of Project:						
Person-Months	Per Year	Committed to the	Cal:	Acad:	Sumr:	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support						
Project/Proposal Title:						
Source of Support:						
Total Award Amount: \$			Total Award Period Covered:			
Location of Project:						
Person-Months	Per Year	Committed to the	Cal:	Acad:	Sumr:	

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Current and Pending Support

See Section D.8 for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this						
Investigator: Peter Norris				Other agencies (including NSF) to which this proposal has been/will		
Support:	<input type="checkbox"/> Current	<input type="checkbox"/> Pending	<input checked="" type="checkbox"/> Submission Planned in Near Future	<input type="checkbox"/> *Transfer of Support		
Project/Proposal Title:						
Source of Support:						
Total Award Amount:			Total Award Period Covered:			
Location of Project:						
Person-Months	Per Year	Committed to the	Cal:	Acad:	Sumr:	
Support:	<input type="checkbox"/> Current	<input type="checkbox"/> Pending	<input checked="" type="checkbox"/> Submission Planned in Near Future	<input type="checkbox"/> *Transfer of Support		
Project/Proposal Title:						
Source of Support:						
Total Award Amount:			Total Award Period Covered:			
Location of Project:						
Person-Months	Per Year	Committed to the	Cal:	Acad:	Sumr:	
Support:	<input type="checkbox"/> Current	<input type="checkbox"/> Pending	<input type="checkbox"/> Submission Planned in Near Future	<input type="checkbox"/> *Transfer of Support		
Project/Proposal Title:						
Source of Support:						
Total Award Amount: \$			Total Award Period Covered:			
Location of Project:						
Person-Months	Per Year	Committed to the	Cal:	Acad:	Sumr:	
Support:	<input type="checkbox"/> Current	<input type="checkbox"/> Pending	<input type="checkbox"/> Submission Planned in Near Future	<input type="checkbox"/> *Transfer of Support		
Project/Proposal Title:						
Source of Support:						
Total Award Amount: \$			Total Award Period Covered:			
Location of Project:						
Person-Months	Per Year	Committed to the	Cal:	Acad:	Sumr:	
Support:	<input type="checkbox"/> Current	<input type="checkbox"/> Pending	<input type="checkbox"/> Submission Planned in Near Future	<input type="checkbox"/> *Transfer of Support		
Project/Proposal Title:						
Source of Support:						
Total Award Amount: \$			Total Award Period Covered:			
Location of Project:						
Person-Months	Per Year	Committed to the	Cal:	Acad:	Sumr:	

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Current and Pending Support

See Section ID.8 for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this						
Investigator: Janet Del Bene				Other agencies (including NSF) to which this proposal has been/will		
Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support						
Project/Proposal Title: Matrix Isolation and Theoretical Study of the Mechanisms of Oxidation Processes.						
Source of Support: NSF						
Total Award Amount: 318000			Total Award Period Covered: 5/1/2000-4/30/2002			
Location of Project:						
Person-Months	Per Year	Committed to the	Cal:	Acad:	Sumr:	
Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support						
Project/Proposal Title: Ab Initio Study of Vibrational Anharmonicity and Matrix Effects						
Source of Support: NSF						
Total Award Amount: 247000			Total Award Period Covered: 2/1/1999-1/31/2002			
Location of Project: Youngstown State University						
Person-Months	Per Year	Committed to the	Cal:	Acad:	Sumr:	
Support: <input checked="" type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support						
Project/Proposal Title: Investigative Approaches in the Natural Sciences						
Source of Support: NSF						
Total Award Amount: \$183579			Total Award Period Covered: 8/15/1998-7/31/2001			
Location of Project:						
Person-Months	Per Year	Committed to the	Cal:	Acad:	Sumr:	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support						
Project/Proposal Title:						
Source of Support:						
Total Award Amount: \$			Total Award Period Covered:			
Location of Project:						
Person-Months	Per Year	Committed to the	Cal:	Acad:	Sumr:	
Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support						
Project/Proposal Title:						
Source of Support:						
Total Award Amount: \$			Total Award Period Covered:			
Location of Project:						
Person-Months	Per Year	Committed to the	Cal:	Acad:	Sumr:	
*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.						

Current and Pending Support

See Section ID.8 for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this			
Investigator: James Mike		Other agencies (including NSF) to which this proposal has been/will	
Support:	<input checked="" type="checkbox"/> Current	<input type="checkbox"/> Pending	<input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support
Project/Proposal Title: CSEMS Technology Leaders Scholarship Program			
Source of Support: NSF			
Total Award Amount: 200000		Total Award Period Covered: 6/1/2000-5/31/2002	
Location of Project: Youngstown State University			
Person-Months	Per Year	Committed to the	Cal: Acad: Sumr:
Support:	<input checked="" type="checkbox"/> Current	<input type="checkbox"/> Pending	<input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support
Project/Proposal Title: Integration of Computer Technology into The General Chemistry Curriculum			
Source of Support: BSF			
Total Award Amount: 94945		Total Award Period Covered: 7/30/2000-6/30/2002	
Location of Project: Youngstown State University			
Person-Months	Per Year	Committed to the Project.	Cal: Acad: Sumr:
Support:	<input type="checkbox"/> Current	<input type="checkbox"/> Pending	<input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support
Project/Proposal Title:			
Source of Support:			
Total Award Amount: \$		Total Award Period Covered:	
Location of Project:			
Person-Months	Per Year	Committed to the	Cal: Acad: Sumr:
Support:	<input type="checkbox"/> Current	<input type="checkbox"/> Pending	<input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support
Project/Proposal Title:			
Source of Support:			
Total Award Amount: \$		Total Award Period Covered:	
Location of Project:			
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Support:	<input type="checkbox"/> Current	<input type="checkbox"/> Pending	<input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support
Project/Proposal Title:			
Source of Support:			
Total Award Amount: \$		Total Award Period Covered:	
Location of Project:			
Person-Months	Per Year	Committed to the	Cal: Acad: Sumr:

*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.

H Facilities, Equipment and Other Resources

H The Participating PPA Home Institutions:

The ten participating PPA home institutions each has available:

- Unique opportunities for field sampling, such as historical, environmental, and geologic sites.
- Appropriate lab space and equipment to prepare samples and conduct wet analysis.
- At least a basic range of analytical, chromatographic, and spectroscopic instrumentation to partially characterize the materials (samples requiring more advanced characterization methods can be sent to YSU, or to other major instrumentation facilities, see below)
- Computers (i.e., password protected Windows NT computers) in a relatively secure location that are connected to the INTERNET and that can connect to YSU.
- Several faculty members who have analytical experience or who plan on gaining it through this proposal and, more importantly, an interest in introducing non-destructive analytical techniques to their undergraduate students.

H The Youngstown State University Host Institution:

H2. The YSU Instrumentation Centers:

Youngstown State University has two closely related instrumentation centers. The YSU Center for Biomedical and Environmental Research is housed on the 4th floor of the W. Decher Science Hall and specializes in instrumentation for the characterization of biological, biomedical, and environmental materials. The YSU Structure Center is housed on the 5th floor of the W. Decher science hall and specializes in the characterization of materials typically synthesized by chemists and chemical engineers. The two centers work closely together, sharing both staff, faculty participants, and instrumentation funding. Both centers were established to serve the teaching and research needs of faculty and students from YSU and other PUIs, especially those in the PPA, and to help meet the needs of users from local governmental organizations and industry (in that priority) It is planned to eventually merge these facilities into a single campus-wide instrumentation facility to maximize efficiency. They have a full time PhD Scientist, Bice Lyison (with a PhD in chemistry and nearly 15 years of post-graduate experience with analytical instrumentation) to assist with data collection and analysis employing chromatography instrumentation, G and C, and G, C-M They are seeking a similar position to assist with elemental analysis, AA, ICP, and ICP-MS An Instrumentation Service Specialist, 0.5 full-time, Ray Hoff (with fifteen years university instrumentation service experience) trained undergraduate and M student assistants to run the instruments and collect data, and faculty advisors to assist with instrumentation operation and method development. YSU has a five-person electronics/computer maintenance staff available at no charge to the center. An extensive staff of network service specialists and computer center personnel are available when needed. The services of these individuals as well as the instrumentation are available to anyone in the academic community both within YSU and to members of the PPA. Schedules for use and remote acquisition protocols will be developed as participants and projects from PPA schools are identified.

The major instruments in these centers are all research grade, modern (typically less than

seven years old) and were purchased with a combination of NSF, Foundation, State, and internal funds. In addition to the smaller chromatographic, spectroscopic, physical, and analytical instruments expected at any Mlevel institution, the centers are equipped with the following modern instrumentation:

- a C-Minstrument with an autosampler and a Solid Phase Micro Extraction, SPM interface and both Electro-Spray, ESI, and Atmospheric Pressure Chemical Ionization, APCI, inlets. This instrument can be run from remote locations over the EB YSU was the first Baker Esquire customer to accomplish the remote control of this C-Minstrument.
- an automated DNA sequencer.
- a CHNOS combustion analyzer.
- several Atomic Absorption, AA, Graphite Furnace, GFAA, and Inductively Coupled Plasma, ICP Atomic Emission, elemental analyzers.
- several computer controlled electrochemical systems.
- two inert atmosphere glove boxes.
- two Baker AX P4 single crystal diffractometers. One is currently equipped with a Cu sealed tube source and an X000 multi-wire area detector for powder studies and the other is equipped with a Msealed tube source, a serial detector, and T-2low temperature system for small molecule single crystal studies.
- a 90 MHz multinuclear NMR with four probes, Variable Temperature, VT, and Pulsed Field Gradient, PFG accessories, and several work stations.
- two automated G-M systems (both with autosamplers and one with a solids probe and one with an SPM interface) One of these is optimized for synthetic samples and one for trace environmental samples.
- a materials characterization lab including: a Differential Scanning Calorimeter, DSC, a Thermal Gravimetric Analyzer, TGA, and a Gel Permeation Chromatograph, GPC.
- older, but functioning, electron microscopy, TEM and SEM instruments.

Each of these instruments is fully available to external users and we have had users from about a dozen PUIs over the last few years. While we charge conventional rates to industrial users (to subsidize undergraduate costs) we have a policy of not charging faculty and student users from PUIs (except for consumables for the largest scale users) Yus is a member in three state-wide instrumentation consortia: NMR, X-ray Diffraction, and Mass Spectrometry. In the case where additional instrumental capabilities, not available at YSU, are needed, time on more sophisticated instruments, such as 500 MHz NMR, solids NMR, CCD X-ray diffractometers, and high-resolution ICP-MS Time for PUIs on this instrumentation is available through YSU's membership in these consortia.

HB. The YSU Science Hall Computer Facilities:

The Wd Becher Science Hall has five computer labs having from 12 to 4 workstations each. One lab is equipped with Macintosh computers while the others are equipped with Windows 95 computers or Windows NT workstations. We also have a half dozen Silicon Graphics and SUN engineering workstations in advanced computer labs for the most demanding applications. All are connected with T1 lines to the EB and to other campus computing resources and labs and to the Ohio Super Computer Center. On the 5th floor of the Science Hall is a lab equipped with 12 Windows NT computers, video projection capabilities, fast printers, etc., and that was designed for

teaching advanced instrumental methods, including remote instrument operation.

H2. The Proposed Addition of Non-Destructive Equipment:

If this grant is funded, the requested instrumentation will be housed in a 1,00 square foot room to allow additional space for the new instrument and, especially, sufficient instructional space near the instruments. With the grant and matching funds, this lab will be set up so that anyone with access will be able to watch lab and instrument operations. If they have a camera on their own computer, they will also be able to video conference with the operators or faculty and students in this lab. The lab will be equipped with a color camera so that students in the attached instructional space or at remote sites will be able to view the instrumentation operations.

When on site, all users will be able to personally operate the instrumentation. When at remote sites, the users will select and prepare samples and mail/courier these to YSU. At the time prearranged for their class, an assistant in the YSU lab will mount these samples on the appropriate instrument. All other aspects of data collection may be remotely controllable.

To maximize system safety and security while also maximizing the educational utility of this equipment, those activities that are not dangerous to the occupants of the lab and/or the instruments will be controllable from anyplace on the campus (e.g., the tilt/pan/zoom cameras). To minimize operator, instrument, and computer safety problems, the following general procedures will be adopted (i.e., modeled after those at other existing remote sites). For example, a mechanical switch will be added to the X-ray shutter wiring so that the shutter will not be operable unless the local users feel it is safe (this will minimize any chance of accident for the YSU assistants). The ability to control the instrumentation will be limited to certain approved IP addresses at participating schools to prevent unauthorized or malicious use. As a further precaution, each IP address will be able to take control of the scheduled instrument(s) only during its scheduled time slot(s) (this will also prevent one user from accidentally interfering with another user's experiment). However, all PUI users will be able to monitor all aspects of diffractometer operation at all times. For maximum educational utility, users will be able to book time for specific classes/days up to a semester in advance.

H3. Instrumentation Maintenance:

The YSU Centers are well equipped to keep our instruments operating. For example, the two X-ray diffractometers have had less than one month's down time over the last six years, while the NMR has had less than four weeks down time (after a major quench) in five years, in each case while waiting for parts. This in-service rate is comparable to that of major research institutions, which is quite remarkable since over 80% of instrument operation is by undergraduates, mostly in courses. Our Instrumentation Service Specialist, Ray Hoff, is exceptionally skilled at instrumentation maintenance and we routinely send him to the instrument vendors' own service technician courses when we buy a new instrument. On those rare occasions when outside service has been required, we have always been immediately authorized to do so, using funds from an annual repair and maintenance account. At least one faculty member per instrument, is also trained in instrument maintenance, which is especially valuable when it is not clear if the problem is instrumental or with the sample chemistry.



Youngstown State University / One University Plaza / Youngstown, Ohio 44555-3663

September 15, 2000

Department of Chemistry

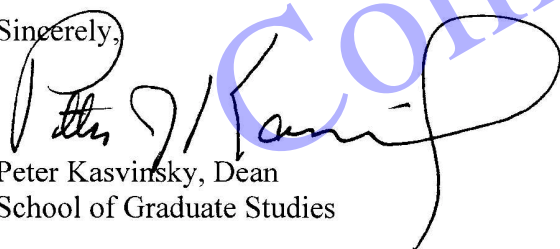
(330) 742-3663

Division of Chemistry
National Science Foundation

Youngstown State University (YSU) is very committed to this project. Over the last 5 years, we have provided well over a million dollars of cash matching funds towards science and science education initiatives - about half of all the matching funds provided in total. These funds have had a substantial impact at the undergraduate and MS levels and have led to close ties between YSU SMET departments, with other PUIs, with HBCUs, and with regional PhD schools. Professor Lovelace-Cameron at YSU directs programs for minority students including ACS Project Seed and high school programs for at-risk students. Increasing the diversity on campus is one of the top four university priorities at YSU.

YSU has committed a substantial match towards the initiation of this project. The faculty are not asking for compensation for directing the research. YSU will support the average cost of tuition and fees of \$5,721 per year. In addition, YSU is reducing its normal indirect requirement of 42% to 25%. The Department will commit \$500 in supplies for each participant. Our institution has committed substantial faculty and support services to run this program. For Example, YSU has committed to not charging colleagues for the use of its research-grade instrumentation, including its 400 MHz NMR (with PFG and VT capabilities and 4 probes), its two single crystal diffractometers, its two GC-MS and one LC-MS instrument, etc.

Sincerely,



Peter Kasvinsky, Dean
School of Graduate Studies

dmu