



**YOUNGSTOWN STATE UNIVERSITY
DEPARTMENT OF CHEMISTRY**



FACULTY RESEARCH INTERESTS

Dr. Larry Curtin: Synthesis and electrochemical characterization of self-assembled alkanethiol monolayers containing ferrocene dimers. Spectroelectrochemical characterization of conducting polymers with buckminsterfullerene (C₆₀) covalently attached to the polymeric backbone.

Dr. Ganesaratnam K. Balendiran: Function and activity of biological molecules related to physical and biological properties. Sugar metabolism, nucleotide metabolism and gene regulation.

Dr. Allen D. Hunter: His main interest lies in the fields of automation and cyberization of scientific instrumentation and remote access to such instruments. Dr. Hunter's CyberLabNet team at both the YSU Department of Chemistry and the Youngstown Business Incubator are developing a testing CyberLabNet tool kit that will be initially applied to networks of chemical instrumentation facilities (X-Ray Diffractometers, Nuclear Magnetic Resonance Spectrometers, Mass Spectrometers, etc.). *However*, the architecture of the system is being design with much broader applications in mind (e.g., ranging from the control of digital machine tools to mobile objects) so that they can be developed from the same core code. His other interests are in the synthesis and characterization of new nanoscale molecular materials for electronic and nonlinear optical applications. This materials science project crosses the boundaries between traditional synthetic chemistry and adjacent areas including analytical and polymer chemistry. He is further interested in bioactive organometallic materials, structural studies in the solid state (X-ray diffraction) and solution (liquid crystal NMR), and in chemical education research.

Dr. John Jackson: Synthetic organic chemistry of new C-C bond formation strategies using bis-(2,2,2-trifluoroethyl)-phosphonoesters.

Dr. Sherri Lovelace-Cameron: Synthesis of organometallic monomers which can serve as precursors for organometallic polymers. Use electrochemistry to study the effects of electron transfer reactions on the reactivity and bonding modes of pi-coordinated ligands in organometallic compounds. Using Service learning or the Self-Regulated Learning model to enhance student learning.

Dr. Howard Mettee: (1) Computational chemistry and modeling of active site energetics in enzyme catalysis, in particular looking at the role of copper ion in superoxide dismutase and zinc ion in beta lactamase; (2) Physical and chemical modification of hardwoods and charcoal to enhance water filtration characteristics; and (3) synthesis and evaluation of dimethylacrylate based resins as articular cartilage materials for degraded, weight bearing joints.

Dr. Daryl Mincey: Environmental analysis, using Inductively Coupled Plasma Atomic Absorption Spectroscopy, of metal contamination of Mahoning River and Brownfield site samples. Elemental analysis of archeological and historical artifacts. Analysis of Ricin and other toxic proteins in collaboration with the national lab of the Food and Drug Administration in Cincinnati, Ohio.

Dr. Brian D. Leskiw: Synthesis and mass spectrometric analysis of transition metal clusters; gas phase nucleation and ion-molecule reactions, quantification of trace contaminants.

- Dr. Clovis A. Linkous: Dr. Linkous studies advanced membrane electrolyte technology for water electrolysis and fuel cells, hydrogen storage cycles, and photochemistry of semiconductor particulates, with an overall objective of using solar energy to perform useful chemistry.
- Dr. Peter Norris: Chemical synthesis of glycomimetics and uses of monosaccharides as chiral platforms. Two main areas of interest: i) the preparation of the aminosugars found in the capsular polysaccharides of *S. aureus* bacteria (as part of the YSU PACER Biotechnology Center) and glycomimetics thereof as potential antibiotics; ii) the use of conformationally well-defined monosaccharides as platforms upon which to introduce chemical diversity using polymer-supported methods and parallel synthesis techniques.
- Dr. Michael Serra: Metal catalyzed oxidation of proteins by reactive oxygen species. Isolation and characterization of oxidized proteins by polyacrylamide gel electrophoresis, HPLC, enzyme assays, and mass spectrometry.
- Dr. Josef B. Simeonsson: Analytical Chemistry, Atomic and Molecular Spectrometry Methods, Trace and Ultratrace Analysis, Analytical Laser Spectroscopy Methods- Fluorescence, Ionization and Raman, Environmental Analysis and Clinical Analysis, Biogeochemical cycling of trace species, environmental remediation, Biological trace element research, Flame and plasma diagnostics, plasma spectroscopy.
- Dr. Nina V. Stourman: Bacterial functional genomics during response to stress; bacterial glutathione and carbohydrate metabolism. Study of the mechanism and the biological role of bifunctional enzyme glutathionylspermidine synthetase/amidase (GSS) and its products in *E.coli*.

Dr. Timothy Wagner: i) Synthesis and characterization of inorganic nitride-fluoride compounds. Preparation of powder and single crystal samples for structural characterization by X-ray diffraction, scanning electron microscopy and transmission electron microscopy. ii) Synthesis and characterization of metal-ceramic interpenetrating networks. These compounds, produced in collaboration with Fireline TCON Inc. of Youngstown, are unique ceramic-metallic composites manufactured by immersion of ceramic preforms in a bath of liquid metal. The TCON materials have properties that outperform traditional composites and are useful in high-temperature industries where strength, hardness, and toughness are required of the materials. Other potential uses of the TCON materials extend to armor and projectile proof barriers and advanced brake rotor materials.

COLLABORATIVE FACULTY RESEARCH INTERESTS

PACER Center for Biotechnology (Participating Chemistry Faculty: P. Norris)

The YSU Center for Biotechnology addresses research projects at the interface of chemistry and biology, that hold promise for the development of biotechnological methods. Among the projects currently underway:

Development of recombinant antibodies against *Staphylococcus aureus* surface markers

We have purified a trisaccharide component from the polysaccharide capsule of *S. aureus* and are in the process of raising antibodies against this trisaccharide. Once we have isolated monoclonal antibodies, we will test them against synthetic carbohydrates, and engineer recombinant antibodies for tighter binding to the antigen. (Collaborative faculty member in the Department of Biological Sciences: Dr. Diana Fagan.)

Stimulation of soil bacteria for increased enzymatic degradation of trichloroethylene In collaboration with BioRemedial Technologies, Inc., we are testing several compounds for their abilities to induce soil bacteria to produce higher levels of enzyme activities that can degrade trichloroethylene, a common soil contaminant. (Collaborative faculty member in the Department of Biological Sciences: Dr. Carl Johnston.)

Lake Erie Enology Research Center (Participating Chemistry Faculty: D. Mincey)

The LEERC is a collaborative effort between academic institutions and private organizations with a strong interest in winemaking and fermentation processes as they relate to the characteristics of Lake Erie wines. (Collaborative faculty members in the Department of Biological Sciences: Dr. John Usis and others.)