

Faculty with Research Activities

Jeffrey Csernica, Chair and Professor (PhD, Massachusetts Institute of Technology)

Teaching interest

Materials and polymer science, transport operations, separations

Research interest

Gas and liquid transport in polymers, plastics recycling, polymer surface modification, polymer blends and filled polymers

Potential thesis projects

- Mechanical properties and characterization of filled polymers from renewable resources
- Properties of polymer coatings made from bio-derived seed oil.

Michael D. Gross, Assistant Professor (PhD, University of Pennsylvania)

Teaching interest

Materials science, chemical reaction engineering, energy conversion

Research interest

Electrochemistry, catalysis, ceramic materials, solid oxide fuel cells

Potential thesis projects

- Redox stability of doped-strontium titanates for use in SOFC anodes
- Microstructural influence of the conducting phase on anode electrochemical activity

Erin L. Jablonski, Assistant Professor (PhD, Iowa State University)

Teaching interest

Materials and polymer science, transport phenomena, chemistry of surfaces

Research interest

Physics and chemistry of polymer thin films, photoresist technology, microfluidics

Potential thesis projects

- A microfluidic technique to study degradation and release in polymers for controlled drug delivery
- A microfluidic mimic for tumor vasculature: uptake and elution of small molecules from semi-permeable vessels
- An alternative microfluidic method of cell encapsulation and passive separation

William E. King, Professor (PhD, University of Pennsylvania)

Teaching interest

Process control, biomedical engineering, chemical reaction engineering, applied mathematics

Research interest

Phototherapeutics, tissue engineering

Potential thesis projects

- Kinetic modeling of photobleaching reactions related to photodynamic therapy
- Modeling of photon migration within tissue

James E. Maneval, Associate Professor (PhD, University of California, Davis)

Teaching interest

Process design, applied mathematics

Research interest

NMR methods in engineering, separations, process development

Michael J. Prince, Professor (PhD, University of California, Berkeley)

Teaching interest

Design, biochemical engineering, unit operations, heat transfer

Research interest

Active and inductive pedagogies, assessment and repair of student misconceptions, factors affecting student motivation and self-directed learning

Timothy M. Raymond, Associate Professor (PhD, Carnegie-Mellon University)

Teaching interest

Atmospheric physics and chemistry, materials science, material and energy balances, particle technology

Research interest

Aerosol-water interaction, indoor-outdoor pollution, organic aerosols

Potential thesis projects

- Influence of long-term particle aging and oxidation on water uptake in the atmosphere
- Investigation of mineral dust inclusions on the morphology of mixed organic/inorganic aerosols
- Studying the morphology, hygroscopicity and cloud condensation activity of ambient aerosol particles from various sources

Ryan C. Snyder, Assistant Professor (PhD, University of California, Santa Barbara)

Teaching interest

Product and process design, engineering mathematics, separations

Research interest

Design of structured products, pharmaceutical engineering, crystallization

Potential thesis projects

- Pharmaceutical nanocrystallization: the onset of crystal growth
- Morphology prediction and measurement of pharmaceutical hydrate crystals
- Process development of inorganic crystallization for solar cells applications

Margot A. S. Vigeant, Associate Professor (PhD, University of Virginia)

Teaching interest

First-year engineering, chemical engineering thermodynamics, bioprocess engineering

Research interest

Chemical engineering pedagogy, modeling of small molecule transport in microdialysis, bacterial adhesion and total internal reflection microscopy

Potential thesis projects

- Inquiry based activities to repair misconceptions about reaction rate and reaction equilibrium
- Time-dependent modeling of glucose transport in rat-brain microdialysis

Brandon M. Vogel, Assistant Professor (PhD, Iowa State University)

Teaching interest

Biomaterials, bioprocess engineering, transport

Research interest

Polymer synthesis, controlled and targeted drug delivery, microwave methods in polymer and nano-crystal synthesis

Potential thesis projects

- The synthesis and characterization of side chain functionalized polyesters
- The synthesis of prodrug erodable polymers for the treatment of cancer
- Quantifying the kinetics of semiconductor quantum dot formation
- Etching the surface of semiconductor quantum dots as a means to control their photo-physics

Katsuyuki Wakabayashi, Assistant Professor (PhD, Princeton University)

Teaching interest

Materials and polymer science, process and product design, nanoscale science and engineering

Research interest

Polymer processing and characterization, nanoscale blends and composites, sustainable engineering, ionomers

Potential thesis projects

- Barrier and Mechanical Property Improvements by Exfoliation of High-Aspect Ratio Fillers in Polymeric Materials
- Continuous recycled polymer processing via simultaneous solid-state and melt blending
- Solid-state fabrication of bioplastic blends and nanocomposites for real-world applications