**Research Interest:**
- Biomaterials
- Drug Delivery
- Cell-material interactions
- Stem cell differentiation
- Tissue engineering and Regenerative medicine

**Research methods:**
- Polymer synthesis
- Mechanical characterizations
- Cell culture
- Molecular Biology Techniques (i.e. gene expression)
- Bioreactor studies
- Histology

**Current Projects:**
**Biopolymers as Receptor Agonist**

**Synthetic Composite Scaffolds**

**Nanofibrous Protein Scaffolds**

**Representative Publications:**


**Contact Information:**
Prof. Josephine Allen, Department of Materials Science and Engineering, University of Florida, Gainesville FL 32611-6400 (352) 846-3328; jallen@mse.ufl.edu; http://allen.mse.ufl.edu
In the Lab:

- Functional nanomaterials
- Polymer-inorganic composites for disease diagnostics
- Trying to come up with simple urine-based tests for a variety of diseases including cancer and tuberculosis

Research Highlight:

We have developed a new method to make composites on a fiber.

In Print:


Who we are:

Contact Information:
Prof. Jennifer Andrew, Department of Materials Science and Engineering, University of Florida, Gainesville, FL 32611-6400 (352) 846-3345; jandrew@mse.ufl.edu; http://andrew.mse.ufl.edu
**Prof. Bill Appleton**

**Research Interests:**
- Ion and laser solid interactions
- Nanotechnology
- Graphene synthesis and analysis
- Surface and near-surface physics

**Tools:**
- Ion implantation
- Pulsed laser annealing
- Raman
- Ion beam lithography

**Representative Publications:**

**Research Highlight:**
Selective synthesis of nanoscale Graphene features only where “written” by ion beam lithography and thermal or pulsed laser annealing. (Cover image and 50th anniversary featured article in APL)

**Synergistic Activities:**

**Professional Awards and Honors:**
- Fellow of American Association for the Advancement of Science
- Fellow of American Physical Society
- Fellow of the Materials Research Society
- DOE Award for Significant New Technologies
- DOE Award for Outstanding Sustained Research
- Lockheed Martin Leadership Award
- Bohmische Physikalische Gesellschaft

**Editorial Activities:**
- Co-Editor Applied Physics Reviews
- Board of Editors, American Institute of Physics

**Contact Information:**
Prof. Bill R. Appleton, Department of Materials Science and Engineering, University of Florida, Gainesville FL 32611-6400 (352) 392-2958; applet@eng.ufl.edu; http://appleton.mse.ufl.edu/
**Prof. James (Jim) Baciak**

**Research Interests:**
- Radiation Detection and Measurements
- Nuclear Non-Proliferation and Safeguards
- New Radiation Detector Materials
- Non-Destructive Testing
- Radiation Imaging
- Environmental Sampling

**Tools:**
- Radiation Transport Simulations
- Experimentation
- Data Analysis/Processing

**Representative Publications:**

**Research Highlight:**
Understanding the impact of radiation detector properties is important in order to find the optimal detector material for the application within the nuclear non-proliferation and nuclear security mission. We utilized a combined MCNP/GEANT approach to map the functional dependence of detection performance on the underlying material properties of the detector.


**Synergetic Activities:**

*Professional Affiliations and Activities:*
- Member of Institute for Electrical and Electronics Engineers
- Member of American Nuclear Society
- Member of SPIE
- Vice-Chair/Chair-Elect, Alpha Nu Sigma
- Vice-Chair/Chair-Elect, ANS Scholarship Policy and Coord. Committee
- Program Chair, SPIE Penetrating Radiation Technical Event

*Other Activities:*
- *IEEE Transactions on Nuclear Science*: Associate Editor
- *Co-Developer and Instructor for PNNL Radiation Detection for Nuclear Security Summer School*
- *Program Committee: SPIE Hard X-Ray, Gamma-Ray and Neutron Detector Physics Conference*

**Contact Information:**
Prof. Jim Baciak, Department of Materials Science and Engineering, University of Florida, Gainesville FL 32611-6400 (352) 273-2131; jebaciak@mse.ufl.edu; http://www.mse.ufl.edu
Research Interests:
- Biomaterials/ drug delivery
- Iron in neurodegenerative disease (Alzheimer’s, Parkinson’s)
- Materials for gene delivery
- Polymers for treating cancer
- Tissue regeneration (heart and kidney)

Tools:
- Polymer modification and synthesis
- Collaborations with Med and Vet Schools
- Texture Analysis
- Patenting of useful research (about 60)

Research Highlight:
In collaboration with UF medical school faculty, we invented and patented a novel way to make hospital gauze kill bacteria on contact. A local business was started (QuickMed, Inc.) and the method was licensed to Derma Sciences. Now on the market as “Bioguard”. Figure shows no zone of inhibition for our material on the left.

USP #7,709,694, “Materials with covalently-bonded, nonleachable, polymeric antimicrobial surfaces”; Batich; C, Schultz; G.; Mast; B.; Olderman; G.; Lerner; D.; Toreki; W. (issued May 4, 2010).

Representative Publications:

Synergistic Activities:
- Professional Awards and Honors:
  - Fellow of American Institute of Medical and Biological Engineering
  - UF College of Engineering Award for Mentoring Graduate Students
  - Celebration of Innovation Award (UF) each year from 2007-2013
  - Enhancement of Biomedical Research and Education at UF:
    - Founding Director of the UF Graduate Biomedical Engineering Program (1999-2004).
    - Founding Chief Operating Officer of the Clinical and Translational Science Institute at UF (2008-2010)
    - Director of the Pilot Award Program at the Clinical and Translational Science Institute, CTSI.ufl.edu (2008- present)

Contact Information:
Prof. Chris Batich; Materials Science and Engineering Department, University of Florida, Gainesville, FL 32611-6400
Prof. Tony Brennan

Research Interests:
- Antifouling
- Bioadhesion
- Designed interfaces
- Directed cell responses
- Tissue engineering

Tools:
- Dynamic surface tensometer
- Microengineering/Nanoengineering
- Chemical Synthesis
- Cell Staining/PCR/Imaging
- AFM, SEM, SAXS, XPS, FTIR, GPC

Research Highlight:
Our primary focus is on the design and testing of polymeric surfaces to “direct” cellular response. Our Sharklet Surfaces can be tuned to turn bioadhesion on and off. We are extending our knowledge to new surfaces designs, materials and biological systems through modeling and experimentation.

Representative Publications:
- “Surface Modification of Silicate Glass Using 3-(Mercaptopropyl)trimethoxysilane for Thiol-Ene Polymerization,” Jiun-jeng Chen, Kimberly Nicole Struk, and Anthony Brennan, Langmuir, DOI: 10.1021/la202225g,

Synergistic Activities:
Professional Awards and Honors:
- Honorary Doctor of Science, State University of New York
- Visiting Scientist in SEACOAT European Community
- Margaret A. Ross Endowed Professorship in MSE
- Florida Blue Key Distinguished Professor, University of Florida - 2007

Additional Notes
- Member – NIH - BTSS Study Section – 2007-2011
- Trustee, University of Florida 2003-2004
- Chair, Faculty Senate 2003-2004
- Associate Director of the Center for Macromolecular Science & Engineering

Contact Information:
Prof. Tony Brennan, Department of Materials Science and Engineering, University of Florida, Gainesville FL 32611-6400 (352)392-6281; abrennan@mse.ufl.edu ; http://brennan.mse.ufl.edu
Research Interests:
- Materials Characterization and Analysis
- Sustainable Materials
- Sustainable Engineering
- Large-scale Microanalysis of Structural Materials

Tools:
- Scanning Electron Microscopy
- Electron Probe Microanalysis
- Energy Dispersive Spectroscopy
- Transmission Electron Microscopy

Research Highlights:
Lignin, a waste product of the paper industry and biorefineries, can be made into nanotubes of specific aspect ratio. The surface of these nanotubes can be functionalized internally and externally with a wide scope of applications in agriculture, drug delivery, and enhancing of longevity of reinforced concrete structures.

Representative Publications:

Functionalized Lignin can be used as an ion scavenger decelerating the Cl diffusion in concrete structures and extending their life time.

Professional Activities:
- Microscopy Society of America (MSA)
- Florida Society for Microscopy (FSM)
- Southeastern Electron Microscopy Society (SEMS)
- Society of Women Engineers (SWE)

Contact Information:
Dr. Luisa Amelia Dempere, Research Service Centers (http://rsc.aux.eng.ufl.edu/), College of Engineering, University of Florida, Gainesville FL 32611-6400; (352) 392-6982; ademp@mse.ufl.edu; http://dempere.mse.ufl.edu
Research Interests:
- Biomedical applications of magnetic micro- and nanoparticles
- Biomedical/Biomagnetic device development
- Magnetic iron biomineralization and neurodegenerative disease

Tools:
- Nanomagnetic gene transfection
- Magnetic ion channel activation (MICA) / Magnetic Force Bioreactor
- Magnetic fluid hyperthermia
- Superconducting Quantum Interference Device Magnetometry

Research Highlight:
Our group has developed novel technology for using bio-functionalized magnetic nanoparticles to target specific cell surface receptors and activate biochemical signaling pathways.


Representative Publications:

Synergistic Activities:

Professional Awards and Honors:
- Fellow of Society of Biology (2012)
- Fellow of Institute of Nanotechnology (2007)
- Fellow of Royal Society of Medicine (2007)

Editorial Activities:
- *IEEE Transactions on Nanobioscience*: Associate Editor
- *Journal of Bioengineering & Biomedical Science*: Editorial Board
- *The Open Biomedical Engineering Journal*: Editorial Board
- *International Journal of Molecular Sciences*: Guest Editor
- *Materials*: Guest Editor
- *Nanomagnetic Actuation in Biomedicine: Basic Principles and Applications* (CRC Press / Taylor & Francis): Editor

Contact Information:
Prof. Jon Dobson, Department of Materials Science and Engineering, University of Florida, Gainesville FL 32611-6400 (352) 846-3367; jdobson@ufl.edu; http://www.bme.ufl.edu/people/dobson_jon
Research Interests:
• Engineering problem-solving
• Critical thinking
• Active learning

Methods:
• Qualitative data collection
• Grounded theory
• Phenomenology
• Discourse analysis
• Protocol analysis

Research Highlight:
Verbal protocol analysis has been used to examine the processes students use while solving open-ended MSE problems. The pathways they follow are related to their epistemic beliefs.


Representative Publications:

Synergistic Activities:
• Associate Editor, Journal of Engineering Education
• Steering Committee, The POGIL Project
• Editor, ASEAN Journal of Engineering Education
• Vice Chair for Programs, Educational & Research Methods Division, ASEE (2013)
• UF Dean’s Fellow for Engineering Education
• Member, UF Academy of Distinguished Teaching Scholars
• Director, UF REU in Infrastructure Materials
• Education Director, Center for Tomorrow’s Materials
• ABET Evaluator for MSE programs

Contact Information:
Prof. Elliot P. Douglas, Department of Materials Science and Engineering, University of Florida, Gainesville FL 32611-6400 (352) 846-2836; edoug@mse.ufl.edu; http://douglas.mse.ufl.edu
Prof. Gerhard Fuchs

Research Interests:
- High temperature materials
- Coatings/environmental resistance
- Nuclear materials
- Computational materials science
- Industry driven

Tools:
- Processing
- Mech props testing
- Microstructure
- JMatPro, ThermoCalc

Research Highlight:
Working with industry to evaluate/develop alloys and processes for higher temperature capabilities for IGT and aero blades and vanes.

Representative Publications:
- “Microstructural evolution of a carbon modified single crystal Ni-base superalloy”, Materials Characterization, with A.J. Wasson, accepted for publication.
- “The Effect of Carbon Additions on the Microstructure and Mechanical Properties of Single Crystal Ni-base Superalloys (Keynote Paper)”, Plasticity, with K.A. Al-Jarba, accepted for publication.

Synergistic Activities:
Professional Awards and Honors:
- UF-MSE Triple Point Award
- UF-COE Exemplary Graduate Advisor/Mentor
- TMS- Young Leaders Award
- Eastern NY ASM Chapter – Geisler Award
- GE Materials, Manufacturing, Quality Engineering Award

Editorial Activities:
- Reviewer for Acta Met, Met Trans, Scripta Met, etc
- International Materials Review: Editorial Board

Contact Information:
Prof. Gerhard Fuchs, Department of Materials Science and Engineering, University of Florida, Gainesville FL 32611-6400 (352) 846-3317; gfuch@mse.ufl.edu; http://fuchs.mse.ufl.edu

Figure 3 – As-cast microstructures of a) CMSX-8 b) CMSX-486 and c) PWA1484.

Prof. Sedat Goluoglu

Research Interests:
- High Performance Computing
- Nuclear Criticality Safety
- Neutron and Gamma Cross Section Processing
- Time-Dependent Transport
- Reactor Physics
- Monte Carlo Transport
- Nuclear Safeguards and Security

Research Highlight:
Full core depletion calculations involve hundreds of thousands of mixtures. Continuous energy Monte Carlo methods are used on high performance computing platforms to compute the region fluxes and problem-dependent multigroup nuclide cross sections for depletion analysis. Various parallelization techniques are investigated for optimum performance.

Representative Publications:

Synergistic Activities:

Professional Activities:
- Technical Program Chair, 2013 ANS Annual Meeting
- Assistant Technical Program Chair, 2012 ANS Winter Meeting, 2011 ANS Winter Meeting
- ANSI/ANS-8.1 Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors working group member
- ANS Nuclear Criticality Safety Division executive board member (2006-2009) and treasurer (2010-2011)

Editorial Activities:
- Reviewer for Annals of Nuclear Energy and Nuclear Technology
- Guest Editor: Special Issue of Science and Technology of Nuclear Installations

Contact Information:
Prof. Sedat Goluoglu, Department of Materials Science and Engineering, Nuclear Engineering Program, University of Florida, Gainesville FL 32611-6400, (352) 294-1690; goluoglu@mse.ufl.edu
Prof. Laurie Gower

Research Interests:
- Biomineralization - formation of bones, teeth, shells, etc.
- Biomimetic processing of organic-inorganic hybrid materials
- Biomimetic bone substitutes and repair of dental lesions
- Pathological biomineralization, such as kidney stone formation
- Electroactive peptide linkers for biosensors & dynamic patterning

Tools:
- Polymer-induced liquid precursor (PILP) mineralization process
- Phage display for peptide linkers
- Electron and optical microscopy
- X-ray and electron diffraction
- Thermophysical analysis

Representative Publications:

Research Overview:
Our group is interested in the materials processing techniques utilized by biological systems, with emphasis on the role biopolymers and organic templates play in modulating crystal growth. The goal is to develop novel approaches toward the fabrication of organic-inorganic hybrid systems with precisely tuned properties.

Synergistic Activities:
- Co-editing a Handbook on Biomineralization- Characterization Techniques
- Co-Chair for PACRIM 10 Symp. 23: Advances in Biomineralized Ceramics, Bioceramics, and Bioinspired Designs
- Best poster award for Faraday Discussions 159: Crystallization- A Biological Perspective
- Alliance for Graduate Education and the Professoriate (AGEP)- Graduate Advisor Award

Contact Information:
Prof. Laurie Gower, Department of Materials Science and Engineering, University of Florida, Gainesville FL 32611-6400 (352) 846-3336; lgowe@mse.ufl.edu ; http://gower.mse.ufl.edu/index.html
Distinguished Prof. Paul Holloway

Research Interests:
- Photonic and Electronic Materials
- Luminescent Materials
- colloidal Nanoparticles/Quantum Dots
- Surface Science And Surface Analysis
- Thin Films

Experimental Techniques:
- Bottoms-Up Synthesis of Nanoparticles
- Fabrication of Luminescent Displays
- AES, XPS, SIMS, RBS, TEM, AFM, PL/PLE, CL
- Simulation Modeling

Research Highlight:
- Quantum Dot Hybrid Light Emitting Diodes-QLEDs
- Solution processed
- Full color, record brightness
- Efficiencies rival OLEDs (Nature Photonics 5 543 (11)).
- Nanophosphor applications
- Core/shell/shell structures
- Scintillation detectors
- Medical imaging
- Ground water sensor
- Solar cells

Representative Publications:

Synergistic Activities:

Professional Awards and Honors:
- Fellow of AVS: Science and Technology Society
- Fellow of ASM International
- Albert Nerken Award
- E.W. Mueller Award, University of Wisconsin-Milwaukee
- Medal, University of Helsinki
- Ellis Verink, Jr. Prof. of Materials Science and Engineering
- Doctoral Dissertation Advisor/Mentoring Award
- University Teacher-Scholar of Year
- “Paul Holloway Young Investigator Award” endowed with the AVS
- Lifetime Achievement Award for Luminescent Materials

Editorial Activities:
- Editor Emeritus, Crit. Of Rev. Solid State & Material Sciences

Contact Information:
Dist. Prof. Paul H. Holloway, Department of Materials Science and Engineering, University of Florida, Gainesville FL 32601-6400; (352) 846-3330; pholl@mse.ufl.edu; http://holloway.mse.ufl.edu
Research Interests:
• Semiconductor Processing
• Structure Property Relationships in Devices
• Advanced Microelectronics Fabrication
• Anodes for Li Ion Batteries

Tools:
• Ion Implantation, MOCVD, RTA etc.
• Focused Ion Beam and TEM
• Atom Probe tomography
• Process Simulation FLOOPS

Research Highlight:
Demonstrated the first application of ion beam mixing to dramatically improve the cycle life of high capacity Ge and Si conversion anodes for Li ion batteries.

Representative Publications:

Synergistic Activities:

Professional Awards and Honors:
• Fellow of the Materials Research Society
• Fellow of IEEE
• Fellow of ASM
• College of Engineering Graduate Mentoring Award 2011
• University of Florida Research Foundation Professorship (2012-2015)
• Chair of the International Committee on Ion Implantation Technology

Students
• Graduated 32 Ph.D. Students, most employed by the semiconductor industry (Intel, IBM, Applied Materials etc.)

Editorial Activities:
• Journal of Materials Science: Editorial Board

Contact Information:
Prof. Kevin Jones, Department of Materials Science and Engineering, University of Florida, Gainesville FL 32601-6400 (352) 846-3301; kjones@eng.ufl.edu; http://swamp.mse.ufl.edu
Research Interests:
• Experimental Reactor Physics
• Monte Carlo Methods Development
• Radiation Measurement Techniques
• Non-proliferation and nuclear security

Tools:
• Monte Carlo Simulation
• Neutron Irradiations
• Reactor Experiments

University of Florida Training Reactor - Director

The University of Florida has undertaken an ambitious project to replace its 50-year old protection and control system with a new, modern digital system. Once modified, the facility will provide training and education for the future workforce in the area of digital control and instrumentation for nuclear reactors. This effort ushers in a new focus on digital control and instrumentation, and augments the existing Nuclear Engineering Program at UF.

Representative Publications:

Contact Information:
Prof. Kelly A. Jordan, Nuclear Engineering Program, 180 Rhines Hall, University of Florida, Gainesville FL 32611-6400 (352) 294-1206; kjordan@ufl.edu
Dr. Joseph Mack

Research Interests:
• High energy density physics
• Plasma physics
• Radiation transport
• Inertial fusion
• DoE/DoD science
• Nuclear Proliferation

Tools:
• Theory
• Computational physics
• National Ignition Facility
• Omega Laser Facility
• National Laboratories

Research Highlight:
Thermonuclear burn diagnostic developed and now operational at the National Ignition Facility, Lawrence Livermore National Laboratory. This diagnostic is providing critical information about capsule performance for inertial fusion ignition.

Representative Publications:

Los Alamos National Laboratory,
Leadership Positions:
Nuclear Weapons Diagnostic Test coordinator
Assoc. Group Leader for Beam Dynamics (SDI Program)
Project leader for particle beam lethality (SDI Program)
Group leader for Laser-matter Interaction and Fusion Physics
Program manager for Los Alamos ICF experiments
NIF High-bandwidth gas Cherenkov detector project lead
Principle investigator for detection of underground structures
Past member of LDRD Instruments & Diagnostics Review Committee
DOE Unexploded Ordinance National Advisory Board member
Project leader for laser lethality
Threat Reduction Programs Coordinator
Los Alamos program development lead for the Future Combat System
JASON invitee

Contact Information:
Dr. Joseph Mack, Department of Materials Science and Engineering, University of Florida, Gainesville, FL 32611, 352-846-1376; jmack@mse.ufl.edu
Research Interests:
- Design
- Metallurgy
- Medical technology
- Materials under extreme environments

Professional Awards:
- NASA Early Career Grant
- NSF CAREER Grant
- TMS Young Leader Award

Representative Publications:

Topic Highlight: Self-Healing Metals
Advanced metal-matrix composites reinforced with shape memory alloys (SMAs) are being designed for repair and damage mitigation through a liquid-assisted self-healing process.

Contact Information:
Prof. Michele Manuel, Department of Materials Science and Engineering, University of Florida, Gainesville FL 32611-6400
Office: (352) 846-3780 ; Email: mmanuel@mse.ufl.edu ; Website: http://www.materialsdesigngroup.com
Prof. Jack Mecholsky

Research Interests:
- Fracture of brittle materials
- Fractal Geometry & Fracture
- Quantitative Fractography
- Mechanical Behavior of Biomaterials

Research Tools:
- Optical & Scanning Microscopy
- Atomic & Molecular Simulations
- Mechanical Testing & Analysis

Research Highlight:
Developed equation to describe fracture of brittle materials at all length scales:
\[ 2\gamma = E a_0 D^* \]
where \( \gamma \) = fracture energy, \( E \) = elastic modulus, \( a_0 \) = characteristic dimension, \( D^* \) = fractal dimensional increment.

Representative Publications:

Collaborative Capabilities:
Fracture analysis of teeth, dentine, crowns and fixed partial dentures.
Mechanical property testing of materials.
Fracture forensics of glass, glass ceramic, polycrystalline ceramic and single crystal components.
Failure analysis of manatee and human bone.
Failure Analysis of microelectronic components.

Awards and Activities:
- Fellow, American Ceramic Society (ACerS)
- Board of Directors ACerS (2007-2010)
- UF Board of Trustees (2009-2010)
- UF Teaching Award (2003)
- COE Doctoral Advisor/Mentoring Award (2009-2010)

Contact Information:
Prof. Jack Mecholsky, Department of Materials Science & Engineering, University of Florida, Gainesville FL 32611-6400 (352)846-3306 jmech@mse.ufl.edu; http://mecholsky.mse.ufl.edu
Research Interests:
Engineered particles and greener surfactant (surface active molecules) and polymer systems for applications in minerals, chemicals, microelectronics, biomedical, advanced materials, and agro industries

Tools:
- Atomic Force Microscopy (AFM)
- FTIR/UV/Raman/Fluorescence Spectroscopies
- Light Scattering, X-ray Diffraction
- SEM/TEM
- Rheometers

(Layers of Surface active molecules on Mica)

Research Highlight:
Understanding and applications of interaction forces to develop controlled release systems, and multifunctional coatings on particles and surfaces

- Visible light activated transparent antimicrobial coatings for homes and healthcare facilities
- Fine particles dispersion, agglomeration
- Modified Polyhydroxy Fullerenes (PHF) and their applications in antimicrobial coatings, bioimaging & therapies,
- Chemical mechanical polishing (CMP) slurries for silicon wafer processing

Representative Publications:

Synergistic Activities:
Interdisciplinary research in collaboration with faculty from Engineering, Liberal Arts and Sciences, Medicine, Vet Medicine, Food and Agricultural Sciences

Professional Awards and Honors:
- Member, National Academy of Engineering (NAE)
- Distinguished Member (Fellow), Society for Mining, Minerals and Exploration Inc. (SME)
- Distinguished Professor, Materials Science and Engineering (UF)
- Member, NAE Board on Earth Sciences and Resources
- President (2006), SME

Editorial Activities:
- Chair, Americas Editorial Board, KONA Powder and Particle Journal
- Assoc. Editor, Journal of Nanoparticle Research

Contact Information:
Prof. Brij M. Moudgil, Particle Engineering Research Center, Department of Materials Science and Engineering, University of Florida, Gainesville FL 32611-6400; Phone: (352) 846-1194; bmoudgil@perc.ufl.edu; http://perc.ufl.edu/moudgil/
Prof. Juan Claudio Nino

NRG

Materials Development for Energy-Related Applications and Investigation of Structure-Property Relationships in Active Ceramics

Research Interests and Methods:
- Multifunctional Ceramics
- Energy Materials
- Dielectrics
- Ionic conductors
- Nuclear Materials & Detectors
- Bioceramics
- Bulk Ceramic Synthesis
- Thin Film Deposition
- Single Crystal Growth
- Fiber Synthesis
- In-Situ Foaming
- Broadband Dielectric Spectroscopy
- Electrochemical Impedance Spectroscopy

Research Highlight:
Nd-doped ceria epitaxial thin films have been successfully grown on substrates with bottom electrodes. This maiden work now enables the direct measurement of the effect of grain size on ionic conductivity in SOFC electrolytes.

Representative Publications:

Synergistic Activities:
- Journal of American Ceramic Society: Associate Editor
- Journal of Electroceramics: Editorial Board
- Materials Research Society: Meetings Assessment Committee (Chair)

Contact Information:
Prof. Juan C. Nino, Materials Science and Engineering Department, University of Florida, Gainesville FL 32611-6400
(352) 846-3787; jnino@mse.ufl.edu; http://nrg.mse.ufl.edu

Professional Awards and Honors:
- Faculty Excellence Award, Materials Science and Engineering (2012).
- University of Florida Research Foundation Professorship (2010-2013).
- International Educator of the Year, University of Florida (2010).
- NSF CAREER Award, National Science Foundation (2005).

Editorial and Professional Society Activities:
- Journal of American Ceramic Society: Associate Editor
- Journal of Electroceramics: Editorial Board
- Materials Research Society: Meetings Assessment Committee (Chair)
Dr. Burton (Pat) Patterson

Research Interests:
- Stereology, Microstructural characterization
- Grain growth, Sintering, Coarsening, Recrystallization
- Analytical and computer modeling of microstructural processes
- Microstructure/property/processing relationships

Tools:
- Microscopy- Optical SEM, TEM
- Thermomechanical processing
- Stereology
- 3D Monte Carlo simulation

Research Highlight:
3D Monte Carlo simulation has been used to study how topology controls the process of grain growth. Means have been developed to identify topological and geometric characteristics of grains, including integral mean curvature, grain face distribution and arrangement. These results have given first time insight into topological mechanism of grain growth.

Representative Publications:

Synergistic Activities:

Professional Activities, Awards and Honors:
- President, Birmingham Chapter of ASM (past)
- Alpha Sigma Mu Board of Trustees (past)
- Gordon Conference –Invited speaker
- International Metallographic Society, 1st place in competition category
- Acta Materialia, Outstanding Reviewer
- Chair and Organizer, International Conference on Microstructology, 1988, 2005

Editorial Activities:
- International Materials Reviews: Editorial Committee

Contact Information:
Dr. Burton (Pat) Patterson, Department of Materials Science and Engineering, University of Florida, Gainesville FL 32611-6400; (352) 846-3781; patters@mse.ufl.edu;
Prof. Steve Pearton

Research Interests:
• Semiconductors
• Device processing
• LEDs, transistors
• Sensors

Tools:
• Ion Implantation
• Dry etching
• Device characterization

Research Highlight:
Develop flexible transistors that can be fabricated on virtually any surface. These could range from tables to windows to fabrics and even paper.


Representative Publications:

Synergistic Activities:

Professional Awards and Honors:
• Fellow of IEEE, APS, TMS, AVS, ECS, MRS, SPIE
• >35,000 citations, h–factor 76
• Bardeen award (TMS), Gordon Moore award (ECS), Electronic Division award (ECS), Thornton award (AVS), Adler award (APS), Ebers award (IEEE)

Editorial Activities:
• Editorial Board (Applied Physics Reviews, JVST, MSE-R, etc.)
• 16 books edited or authored
• 270 invited talks

Contact Information:
Prof. Steve Pearton, Department of Materials Science and Engineering, University of Florida, Gainesville FL 32611-6400 (352) 846-1086; spear@mse.ufl.edu; http://Pearton.mse.ufl.edu
Prof. Scott S. Perry

Research Interests:
- Materials interfaces
- Fundamentals of friction and lubrication
- Atomic scale wear
- Hydrogel surface properties

Tools:
- X-ray Photoelectron Spectroscopy
- Scanning Tunneling Microscopy
- Atomic Force Microscopy
- In situ Tribometry

Research Highlight:
Compositional analysis of hydrogel surfaces as a function of exposure to molecularly tailored surfactants provides an avenue to understanding the properties related to in eye comfort of commercial contact lenses.


Representative Publications:

Synergistic Activities:
Gordon Conference “Chemistry at Interfaces”
Vice-Chair (’06), Chair (’08)
Associate Dean of Undergraduate Research and The Honors College, University of Houston, 2004-2006
“General Chemistry” 4th Ed. by Hill, Petrucci, McCreary, & Perry, Prentice Hall, 2005

Professional Awards and Honors:
National Science Foundation CAREER Award
University of Houston Cooper Award for Teaching Excellence
University of Houston Research Excellence Award

Editorial Activities:
- Tribology Letters Editorial Board

Contact Information:
Prof. Scott S. Perry, Department of Materials Science and Engineering, University of Florida, Gainesville FL 32611-6400 (352) 846-3333; ssp@mse.ufl.edu
Prof. Simon Phillpot

Research Interests:
- Phonon-mediated heat transport
- Ferroelectric and dielectric materials
- Nuclear Fuel
- Simulation Methodologies

Tools:
- Atomic-level simulations
- Electronic-structure methods
- Theory

Research Highlight:
Large-scale molecular-dynamics simulations are used to determine the atomic-level mechanisms of slip and twinning in hcp Mg. This will help drive the development of light-weight alloys for automotive and aerospace applications.

Representative Publications:

Synergistic Activities:

Professional Awards and Honors:
- Fellow of American Association for the Advancement of Science
- Fellow of American Physical Society
- Fellow of Institute of Materials, Minerals and Mining
- Fellow of Institute of Physics
- #56 on Thomson-Reuters Top 100 Most Influential Materials Scientists
- University of Florida Research Foundation Professorship (2010-2013)

Editorial Activities:
- Science: Member of Board of Reviewing Editors
- Annual Review of Materials Research: Editorial Board
- Journal of Applied Physics: Associate Editor
- Current Opinions in Solid State and Materials Science: Editorial Board
- Journal of Nuclear Materials: Editorial Board

Contact Information:
Prof. Simon Phillpot, Department of Materials Science and Engineering, University of Florida, Gainesville FL 32611-6400 (352) 846-3782; sphil@mse.ufl.edu; http://phillpot.mse.ufl.edu
Dr. Kevin W. Powers

Research Interests:
- Particle Synthesis and Characterization
- Nanoparticle Toxicity
- Supercritical Powder Processing
- Sol Gel Science
- NiMH and Li ion battery particle technologies
- Surfactant inhibition of electrochemical corrosion

Tools:
- SEM/TEM Microscopy
- Atomic Force Microscopy
- FTIR/UV/Raman/Fluorescence Spectroscopies
- Light Scattering
- X-ray Diffraction/X-ray Tomography

Synergistic Activities:
- Associate Director, Particle Engineering Research Center
- Director Industry Programs, College of Engineering
- I/UCRC Industry Center for Particulate and Surfactant Systems
- ISO TC229 nanotechnologies
- ILSI NanoRelease Task Group 1 – “Characterization of engineered nanoparticles for oral toxicity evaluation”
- International Organizing Committee for Particle Systems 2013

Research Highlights:
- Phase–jet supercritical CO2 milling.
- High aspect ratio TiO2 nano flakes for Li Ion batteries, dye doped solar cells, photocatalysts and military obscurants.

Representative Publications:

Contact Information: Dr. Kevin Powers, Department of Materials Science and Engineering, University of Florida, Gainesville FL 32601-6400; (352) 846-3554; kpowers@perc.ufl.edu , hhttp:www.perc.ufl.edu
Prof. DuWayne Schubring

Research Interests:
• Two-phase flow
• Nuclear reactor thermal hydraulics
• Fluid Mechanics
• Advanced Nuclear Reactor Systems

Tools:
• Laser-enabled research lab for high-fidelity flow measurements
• STAR-CCM+ (CFD)
• OpenFOAM (CFD)

Research Highlight – Experiments:
Improved image processing (blue line – compare red line [previous technique]) for film thickness identification in two-phase annular flow. Film thickness distribution is used in most modern annular flow models.

Representative Publications:

Research Highlight – Computation:
Single bubble movement, shape change, distintegration, and collapse using OpenFOAM (open-source continuum mechanics)

Contact Information:
Prof. DuWayne Schubring, Mechanical and Aerospace Engineering, PO Box 118300, 202 Nuclear Science Building (352)392-1401x314, dlschubring@ufl.edu
Prof. Wolfgang Sigmund

Research Interests:
- Photolysis and photocatalysis
- Surface science and quantum levitation
- Electronic biomaterials
- Processing of ceramic materials
- Colloids and nanomaterials

Tools:
- Advanced characterization tools
- Electrospinning and sol-gel chemistry
- Theory

Research Highlight:
Superhydrophobic nanomaterials

Representative Publications:

Synergistic Activities:

Contact Information:
Prof. Wolfgang Sigmund, Department of Materials Science and Engineering, University of Florida, Gainesville FL 32611-6400 (352) 846-3343; wsigmoid@mse.ufl.edu; http://sigmund.mse.ufl.edu
**Prof. Rajiv Singh**

**Research Interests:**
- Advanced Semiconductor Manufacturing
- Processing and Application of Super Hard Materials
- Engineered Substrates (GaN, SiC & Diamond)
  - Defect Reduction in Materials
  - Enhanced Performance in Clean energy electronics
  - Diamond Integrated Semiconductor Electronics

**Research Highlights:**
Advanced semiconductor processing/manufacturing methods for wide band gap semiconductor materials are required for enhancing the performance of devices. Such devices will drive the future energy saving military and commercial applications.

**Representative Publications:**
(From a total of over 500 publications)

**Synergistic Activities:**
Fellows of Six societies and recipient of 4 R&D 100 awards
- Fellow, IEEE (Institute of Electrical and Electronics Engineers)
- Fellow, MRS (Materials Research Society)
- Fellow, APS (American Physical Society),
- Fellow, AAAS (Amer. Assoc. for Advancement of Science)
- Fellow, The Electrochemical Society
- Fellow, American Society of Materials
- R&D100 Award 2004, 2005, 2008 & 2009
- 2009 Governor’s Innovation Award for the state of Florida

**Contact Information:**
Prof. Rajiv Singh, Department of Materials Science and Engineering, University of Florida, Gainesville FL 32611-6400 (352) 392-1032; rsing@mse.ufl.edu; http://singh.mse.ufl.edu/
Research Interests:
- Polymer metallization through plasma surface treatment
- Surface chemistry and catalysis
- Oxidation of metal nitrides
- Metal-ferroelectric material interfaces
- Nuclear fuel material microstructures
- Alloys for extreme environments
- Friction
- Nanomaterials

Tools:
- Atomic-level simulations
- Electronic-structure methods
- Theory

Research Highlight:
Atomic-level simulations using cutting-edge methods are used to quantify the modification of polymer surfaces and carbon nanostructures by reactive ion beams. Such beams are used to toughen surfaces and optimize composite for aerospace applications.

Representative Publications:

Synergistic Activities:

Professional Awards and Honors:
- President of the American Vacuum Society
- Director, Cyberinfrastructure for Atomistic Simulation (CAMS)
- Fellow of the Materials Research Society, American Association for the Advancement of Science, American Physical Society, American Ceramic Society, and American Vacuum Society

Editorial Activities:
- Journal of the American Ceramic Society: Associate Editor
- Journal of Materials Research: Principal Editor
- Physical Review Letters: Divisional Associate Editor
- Physics Today: Advisory Committee Member
- Current Opinion in Solid State and Materials Science: Editorial Board
- Journal of Physics: Condensed Matter: Editorial Board

Contact Information:
Prof. Susan Sinnott, Department of Materials Science and Engineering, University of Florida, Gainesville FL 32611-6400 (352) 846-3778; ssinn@mse.ufl.edu; http://sinnott.mse.ufl.edu
## Research Interests:
- Organic electronic materials and devices
- Device physics, carrier transports and carrier recombination dynamics
- Device processing
- OLEDs, photovoltaics and sensors
- Quantum dots and nanoparticles synthesis and devices

## Tools:
- Thin film deposition systems
- Various spectroscopic techniques
- Optical and electrical characterization

## Representative Publications:

## Research Highlight:
Optoelectronic devices based on small molecular materials, conjugated polymers, quantum dots and nanoparticles. These devices are for TV and smart phone displays, solar energy harvesting and sensing applications.

## Synergistic Activities:

### Professional Awards and Honors:
- Charter Fellow of National Academy of Inventors
- Fellow of Institute of Electrical and Electronic Engineers
- Fellow of Optical Society of America
- Fellow of International Society for Optics and Photonics
- Rolf E. Hummel Professorship in Electronic Materials
- University of Florida Research Foundation Professorship (2011-2014)

### Editorial Activities:
- *Materials Science and Engineering Reports*: Editor-in-Chief
- *IEEE Journal of Display Technology*: Associate Editor
- *IEEE Journal of Photovoltaics*: Associate Editor
- *SPIE Journal for Photonics*: Associate Editor

## Contact Information:
Prof. Franky So, Department of Materials Science and Engineering, University of Florida, Gainesville FL 32611-6400 (352) 846-3790; fso@mse.ufl.edu; http://oemdlab.mse.ufl.edu
Prof. Henry Sodano

Research Interests:
- Functionally Graded Materials and Interfaces
- Ferroelectric and dielectric materials
- Nanomaterials Synthesis
- Sensor Development
- Energy harvesting from Nanostructures
- Self-Healing Polymers

Tools:
- In-Situ testing in SEM
- Polymers and Materials Chemistry
- Mechanics

Mechanics and Modeling
Characterization
Synthesis
Implementation

Research Highlight:
We focus on the development of novel materials, with particular emphasis on ferroelectric nanowires and self-healing polymers. Our group has developed the only methods to date for vertically aligned barium titanate nanowires and has pioneered their integration into high fidelity sensors. We have also developed new interfaces that produce 4 times greater strength in carbon fiber composites.

Representative Publications:

Synergistic Activities:

Professional Awards and Honors:
- 2012 American Society for Composites Young Composites Researcher Award
- NASA Tech Brief Award, 2010
- Virginia Tech 2010 Outstanding Young Alumni Award
- Recipient of the 2009 NSF CAREER Award
- Recipient of the 2009 ASME Gary Anderson Award for Early Career Achievement
- Arizona State University 2009 Faculty Achievement Award

Editorial Activities:
- Associate Editor: J. of Intelligent Material Systems and Structures
- Associate Editor: Smart Materials and Structures
- Associate Editor: Journal of Multifunctional Composites

Contact Information:
Prof. Henry Sodano, Department of Materials Science and Engineering, University of Florida, Gainesville FL 32611-6400 (352) 273-2663; hsodano@ufl.edu; http://plaza.ufl.edu/hsodano/
Research Interests:
- Nuclear Fuel
- Nuclear Waste Management
- Nuclear Fuel Processing
- Nuclear Spent Fuel Storage
- Nuclear Fuel Cycles

Tools:
- MCNP Analysis
- CASMO 4 Analysis
- FRAPCON Analysis
- Bison/Moose Analysis

Research Highlight:
Professor Tulenko has carried out extensive research to develop Enhanced Accident Tolerant Fuel Pellets. He currently is working with AREVA to take his latest development, a SIC UO2 composite fuel into radiation studies and then into an operating reactor.

• Representative Publications:
  - C. Shih, N. Rohbeck, K. Gopalakrishnan, J. S. Tulenko, R. H. Baney “Mechanical properties and XRD studies of silicon carbide inert matrix fuel fabricated by a low temperature polymer precursor route”, Journal of Nuclear Materials, online 20 July 2012

Synergistic Activities:
Professional Awards and Honors:
• Fellow of American Nuclear Society (ANS)
• Awarded Mishima Award of ANS
• Awarded Arthur Holly Compton Award of ANS
• Awarded Glenn Murphy Award Of ASEE
• Awarded Silver Anniversary Award of ANS for Contributions to Fuel Cycle

Editorial Advisory Board Activities:
• Journal of Nuclear Engineering and Sciences
• RadWaste Solutions

Review Boards
• Brookhaven National Laboratory
• ATR Users Executive Committee
• CASL Science Review Board

Contact Information:
Professor James S. Tulenko, 217 Mat. Sci. Bldg., tulenko@ufl.edu, Ph 352-392-1427, Fax 352-846-3355
**Research Interests:**
- Organic electronic materials
- Organic-inorganic hybrid materials
- Photovoltaics and light-emitting devices
- Nanostructures and energy materials
- Surfaces and interfaces

**Tools:**
- Thin film deposition (solution/vacuum)
- Nanocrystal synthesis
- Optoelectronic device fabrication
- Optical/electrical characterization

**Research Highlight:**
Achieved high efficiency photovoltaic cells and light-emitting devices by engineering the organic-inorganic hybrid material interface and by manipulating the light wave propagation. This could lead to cheaper solar energy utilization devices and more energy-efficient light sources.

**Contact Information:**
Prof. Jiangeng Xue, Department of Materials Science and Engineering, University of Florida, Gainesville FL 32611-6400 (352) 846-3775; jxue@mse.ufl.edu; http://xue.mse.ufl.edu/

**Representative Publications:**
- J. Xue, “Perspectives on organic photovoltaics”, *Polymer Reviews* 50, 411 (2010).

**Synergistic Activities:**
**Professional Awards and Honors:**
- National Science Foundation CAREER Award
- Scialog Fellow, Research Corporation for Science Advancement
- Significant Achievements Award, Solid State Lighting Program, U.S. Department of Energy
- Faculty Excellence Award, UF MSE Department
- Distinguished Mentor Award, UF-HHMI Science for Life Program
- Solar Energy Innovation Award, Princeton University

**Editorial Activities:**
- *IEEE Journal of Photovoltaics*: Associate Editor
- *ACS Applied Materials & Interfaces*: Editorial Advisory Board
- *Polymer Review*: Guest Editor
Prof. Yong Yang

Research Interests:
• Radiation Damage
• Aging Management of Light Water Reactors
• Advanced Cladding and Fuel Materials
• Corrosion in Nuclear Reactors

Tools:
• Neutron, proton and heavy ions irradiations
• Simulated LWR water loop
• Characterizations and tests
• Modeling

Research Highlight:
By applying an innovative nanostructured diffusion coating on the advanced F/M cladding, the fuel cladding chemical interaction (FCCI) is significantly mitigated.

Representative Publications:
Clayton Dickerson, Yong Yang, and Todd Allen, Defects and microstructural evolution of proton irradiated titanium carbide,, Journal of Nuclear Materials, 424 (2012).


Synergistic Activities:
Honors & Activities
Howard F. Taylor Award, AFS
Professional Society Involvement
American Nuclear Society (ANS)
Minerals, Metals & Materials Society (TMS)
ANS Florida Section, Chair for Education
American Society of Mechanical Engineers (ASME)
Others
Reviewer: Journal of Nuclear Materials
Journal of Nuclear Materials
Journal of Mechanical Engineering Science
Journal of Engineering Manufacture
Nuclear Engineering and Design
Nuclear Inst. and Methods in Physics Research B

Contact Information:
Prof. Yong Yang, Nuclear Engineering Program, Department of Materials Science and Engineering, University of Florida, Gainesville FL 32611-6400, (352) 846-3791; yongyang@ufl.edu