Material Science and Engineering

Guide and Faculty Specialty Directory for Perspective Graduate Students



www.eng.utk.edu/mse

Welcome to the Department of Materials Science and Engineering

e appreciate your interest in the Department of Materials Science and Engineering (MSE) at the University of Tennessee. MSE offers the following graduate degree programs: MS and PhD in materials science and engineering (with concentrations in materials science, metallurgy, polymers, biomaterials, and nanomaterials).



The MSE graduate program is as diverse as the field it covers. Materials science and engineering is a truly interdisciplinary field, crossing the traditional disciplines of engineering, the physical sciences and areas of life sciences. The MSE curriculum requires students who have perspective, organizational abilities, and the capability to handle demanding interdisciplinary research.



Research Resources

Partnerships between graduate students and faculty create exciting and productive research in four major areas of the department:

- Materials Science and Engineering
- Polymer Science and Engineering
- Metallurgical Engineering
- Nanomaterials

MSE research programs interact with other engineering and science departments, the nearby Oak Ridge National Laboratory (ORNL), and industry to form larger partnerships, creating an unparalleled research environment. The most established and significant partnerships are between the department and ORNL's Materials Science and Technology Division (MSTD), Center for Nanophase Materials Science (CNMS), and Spallation Neutron Source (SNS), which provide students with the opportunity to participate in the division's extensive research program.

http://www.ornl.gov



The department is also allied with the Center for Materials Processing (CMP), a Center of Excellence created in 1984 as part of Tennessee's commitment to higher



education. The Center recognizes educational and research programs of national prominence and provide substantial state funding. CMP's objective is to develop significant research and academic programs that address the specific needs of American industry in the field of materials processing.

http://www.engr.utk.edu/cmp/

Also on the horizon is a new building, the Joint Institute for Advanced Materials (JIAM), which will be a joint UT-ORNL institute for advanced multidisciplinary materials research. JIAM will offer many opportunities for innovative research and collaboration, and the MSE department will be at the forefront of these activities.

Areas of Research



Advanced Structural Materials

Since the early days of the Industrial Revolution, when steel was the material of choice for engineering applications, a wide variety of high-strength metals, alloys, ceramics, polymers, and composites have been developed for structural applications in engineering. Today, advanced structural materials are still at the forefront of materials research, and many faculty, graduate students, and post-doctoral researchers in the MSE department work directly on the development of new structural materials with researchers at Oak Ridge National Laboratory, the Department of Energy's leading laboratory for advanced materials development.



Computational Materials Science

Computational materials science efforts at UT focus on the predictive capabilities of

various simulation methods and are closely related to current experimental activities at UT and Oak Ridge National Laboratory. A wide spectrum of computational modeling and simulation methods, including ab initio methods, molecular dynamics, and finite element analysis, is applied to address current problems in materials research, such as evolving micro-and-nanostructures, small scale mechanical behavior, structural integrity of small devices, and material instabilities, among many others.



Electronic, Optical and Magnetic Materials

Research efforts in electronic, optical, and magnetic materials focus on an interdisciplinary investigation of multifunctional materials for renewable energy, and sensing and optical communication applications. Ongoing activities include materials synthesis and processing, device fabrication, property characterization, and theoretical modeling. Research facilities consist of unique in-house developed experimental systems for integrated electronic, optical and magnetic measurements; powerful electrically assisted laser spectroscopy; and advanced imaging instruments.



Materials for Energy Applications

Relying on fossil fuel is no longer a long-term option. New concepts in energy conservation, energy distribution and alternative energy generation are available but not yet competitive because either the material properties are not adequate or the materials processing is too expensive. Research efforts in materials science at UT tackle both problems by focusing on finding more efficient materials for energy applications at a less-expensive synthesis cost.



Nanomaterials

Materials reduced to the nanoscale can show very different properties compared to what they exhibit in macroscopic form, enabling unique applications that impact areas from biotechnology to electronic materials and advanced energy devices to enhanced structural materials. Faculty and graduate students in the MSE department work on many exciting experimental and theoretical aspects of nanomaterials, from investigating new ways to synthesize and characterize nanoscale materials to exploring the optical, electrical, magnetic, mechanical, and biological properties of novel nanomaterials.



Polymers and Biomaterials

Polymers are among the most widely used materials in the United States—surpassing the combined volume of steel, copper, and aluminum. The polymer industry continually faces new customer demands, furious global competition, and growing environmental concerns. Many problems remain unsolved, and new ones appear each day. The polymer facility at UT addresses these problems collectively through research efforts that include processing and characterization of fiber-based polymeric materials, optoelectronic polymers, synthesis and characterization of biomedical polymers, and chemical modification.



Facilities

The MSE department is located in Farris Hall, with additional laboratory space in the Science and Engineering Research Facility (SERF), a two hundred thirty thousand square foot facility designed specifically for engineering, science, and technology-related research.

The university is currently constructing the Joint Institute for Advanced Materials (JIAM), a



joint UT-ORNL institute for advanced materials multidisciplinary research. JIAM will be the first building constructed on the university's new Cherokee Farm Research Campus. As a national leader in the field of materials research, the College of Engineering and the MSE department will be key beneficiaries of this initiative.

Department of Materials Science and Engineering Faculty



Dr. Kurt E. Sickafus Alvin and Sally Beaman Professor and MSE Department Head Ph.D., Cornell University

414 Ferris Hall Department of Materials Science and Engineering The University of Tennessee Knoxville, TN 37996-2100 Tel: (865) 974-4858 Email: *kurt@utk.edu*

Honors & Affiliations

- Fellow, Los Alamos National Laboratory, 2008
- Los Alamos National Laboratory Distinguished Mentor Performance Award, 2003
- Fellow, American Ceramic Society, 1998

- Electron microscopy, with an emphasis on transmission electron microscopy (TEM), scanning transmission electron microscopy (STEM), and analytical electron microscopy (AEM) techniques.
- Crystallography, radiation damage effects, and microstructure of materials.
- The radiation damage behavior of oxides with structures ranging from spinel to ilmenite to pyrochlore to fluorite to perovskite.

Dr. Roberto Benson

Associate Head and Professor Ph.D., Florida State University

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Honors & Affiliations

- 2013 Outstanding Advisor for the College of Engineering
- Allen and Hoshall Engineering Faculty Award, 2004
- Celanese Teaching and Research Award, 2000

Research Areas

- Chemistry, biological response and morphological changes associated with surface modification of polymeric systems
- Analysis and interpretation of the various molecular processes associated with degradation

Dr. Gajanan Bhat

Professor and Director, UT Nonwovens Research Laboratory (UTNRL) Ph.D., Georgia Institute of Technology

205 TANDEC Building, 1321 White Avenue The University of Tennessee Knoxville, TN 37996-1950 Tel: (865) 974-0976 Email: *gbhat@utk.edu*



Honors & Affiliations

- Distinguished Achievement Award, Fiber Society
- Outstanding Young Engineering Alumni, Georgia Tech
- Fellow. Textile Institute
- Technitext Research Award from International Congress ATNT-2008

Research Areas

- Biodegradable Nonwovens and Composites
- Flame Retardant Nonwovens
- Structure and Properties of High **Performance Fibers**
- Nanoclay Reinforced Polymers, Fibers and Nonwovens
- Multifunctional Composites
- Nanophase MnO, incorporated Fibers and Nonwovens

Dr. Hahn Choo

Associate Professor Ph.D., Illinois Institute of Technology

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Honors & Affiliations

- Leon and Nancy Cole Superior Teaching Award, 2013
- Faculty Award for Excellence in Teaching, 2010







- COE Research Fellow Award, 2005, 2006, 2008, and 2011
- Professional Promise in Research and Creative Achievement, UT, 2006
- Departmental Outstanding Young Faculty Researcher, 2004

Research Areas

- Synthesis, processing and physical/ mechanical behavior of advanced structural alloys
- Development and application of neutron scattering for structural materials research

Dr. Gerd Duscher Professor Dr. rer. pat. University

Dr. rer. nat., University of Stuttgart, Germany

421 Ferris Hall Department of Materials Science and Engineering The University of Tennessee Knoxville, TN 37996-2100 Tel: (865) 974- 5319

Email: gduscher@utk.edu

Honors & Affiliations

- College of Engineering Research Fellow Award, 2011
- George H. Bessis Outstanding Undergraduate Advisor Award, 2008
- Nanotechnology Impact Award, 2004
- Member, MRS, MSA, DPG, APS, TMS

- Electrical activity at interfaces and crystal defects
- Atomic and electronic structure at interfaces



- Atomic resolution Z-contrast imaging
- Atomic resolution electron energy-loss spectroscopy
- Atomic structure calculations with density functional theory

Dr. Takeshi Egami Distinguished Scientist & Professor Ph.D., University of Pennsylvania



208 South College 1413 Circle Drive Department of Materials Science and Engineering, Department of Physics and Astronomy, The University of Tennessee Knoxville, TN 37996-2200 Tel: (865) 974-7204 Email: *egami@utk.edu*

Materials Science and Technology Division Oak Ridge National Laboratory One Bethel Valley Road Oak Ridge, TN 37831-6115 Phone: (865) 574-5165

Honors & Affiliations

- Director, UT-ORNL Joint Institute for Neutron Sciences
- J.D. Hanawalt Award, International Union of Crystallography, 2010
- B.E. Warren Diffraction Physics Award,
- American Crystallography Association, 2003
- Fellow, American Physical Society

Research Areas

Neutron scattering research

- High-temperature superconductivity
- Electronic oxides
- Structure and dynamics of liquids and glasses

Dr. Yanfei Gao

Associate Professor Ph.D., Princeton University

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4100-A277, Oak Ridge National Laboratory Oak Ridge, TN 37831-6164 Tel: (865) 574-2537

Honors & Affiliations

- MSE Faculty Teaching Award, 2013
- COE Research Fellow Award, 2010, 2013
- Chancellor's Professional Promise Award, 2010
- MSE Faculty Research Award, 2010
- Sir Gordon Wu Fellowship, Princeton University
- Joint Faculty, ORNL Materials Science and Technology Division

- Small scale mechanical behavior
- Defects, contact, and friction
- Nanoscale thin film heterostructures
- Computational materials science

Dr. Easo George

Professor and UT-ORNL Joint Faculty Ph.D. University of Pennsylvania

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Honors & Affiliations

- Humbolt Prize, AvH foundation, Germany
- Sustained Outstanding Research Award, U.S. Department of Energy
- Fellow, TSM, ASM
- Buehler Best Paper Award
- MRS Outstanding Symposium Paper Award

Research Areas

- Small-scale mechanical behavior of crystalline and amorphous materials
- Refractory and precious metals for space power applications
- Mechanical behavior at extremes of temperature and strain rate
- Environmental effects on microstructure and mechanical properties

Dr. Wei He

Associate Professor Ph.D., University of Connecticut

303 Ferris Hall Department of Materials Science and Engineering The University of Tennessee





Knoxville, TN 37996-2100 Tel: (865) 974-5275 Email: *whe5@utk.edu*

Honors & Affiliations

- Member, Society of Biomaterials
- Member, Materials Research Society
- Member, Biomedical Engineering Society
- Departmental Faculty Award for Excellence in Research, 2012
- NSF CAREER Award, 2011
- Departmental Faculty Award for Excellence in Teaching, 2010

Research Areas

- Responsive surface coating for enhanced tissue integration of neural prostheses
- Functional biomaterials for peripheral nerve regeneration

Dr. Bin Hu

Professor Ph.D., Chinese Academy of Sciences

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Honors & Affiliations

- Chancellor's Professional Promise Award, 2008
- College Research Fellow Award, 2008
- Departmental Faculty Research Award, 2008
- NSF CAREER Award, 2007

Research Areas

- Magnetic control of constructive and non-constructive excited state and charge transport processes in organic semiconducting materials
- Spin injection and polarization effects on electroluminescence in organic light-emitting diodes
- Singlet and triplet photovoltaic channels in organic solar cells

Dr. David Joy

Distinguished Scientist and Professor D.Phil., University of Oxford, UK

232 Science and Engineering Research Facility Department of Materials Science and Engineering The University of Tennessee Knoxville, TN 37996-2200 Tel: (865) 974-3642 Email: *djoy@utk.edu*



Honors & Affiliations

- Fellow, Royal Microscopical Society (UK)
- Editor Emeritus, SCANNING
- National Winner, Battelle Nanoscience Challenge, 2002
- SRC Distinguished Research Award, 1998

- Monte Carlo modeling of electron and ion interactions in solids
- Metrology and Electron Beam Fabrication of nanostructures
- Advanced techniques for electron beam imaging and microanalysis

Dr. Ramki Kalyanaraman

Professor Ph.D., North Carolina State University

419 Ferris Hall Department of Materials Science and Engineering The University of Tennessee Knoxville, TN 37996-2100 Tel: (865) 974-5539 Email: *ramki@utk.edu*



Honors & Affiliations

- Phi Kappa Phi Honor Society
- Member, MRS, SPIE, TMS, ASM, ACS, and AAAS
- COE Research Fellow Award, 2011
- NSF CAREER Award, 2005

Research Areas

- Thin film growth and characterization
- Phase transformation and self-organization
- Functional nanostructures and nanocomposites for plasmonics, magnetics and nanophotonics
- Energetic beam processing of electronic materials

Dr. David Keffer Professor Ph.D., University of Minnesota

301 Ferris Hall, Department of Materials Science and Engineering University of Tennessee Knoxville, TN 37996-2100 Tel: (865) 974-5322 Email: *dkeffer@utk.edu*



Honors & Affiliations

- STAIR Graduate Program Director
- Allen & Hoshall Engineering Faculty Award, 2008
- COE Research Fellow Award, 2006, 2008
- Departmental Outstanding Advisor Award, 2003
- Departmental Excellence in Teaching Award, 2003
- COE Outstanding Faculty Advisor Award, 2002

Research Areas

- Multiscale materials modeling
- Sustainable energy
- Structure/property relationships in nanostructured materials
- Coarse-grained modeling of polymers

Dr. Veerle Keppens

Professor and Associate Dean for Faculty Affairs Ph.D., Katholieke Universiteit Leuven, Belgium

401A Ferris Hall Department of Materials Science and Engineering The University of Tennessee Knoxville, TN 37996-2100 Tel: (865) 974-3494 Email: *vkeppens @utk.edu*

Honors & Affiliations

- College of Engineering Research Fellow, 2009
- Chancellor's Award for Professional Promise, 2007

- Departmental Outstanding Young Faculty Researcher, 2005
- Alexander Von Humboldt Fellow, 1998-1999
- Fulbright/NATO Fellow, 1995-1998
- Fellow, Acoustical Society of America

Research Areas

- Elastic constants and lattice dynamics of novel materials, including transition metal oxides, frustrated magnets and spin glasses
- Thermoelectric materials

Dr. Kevin Kit

Associate Head and Associate Professor Ph.D., University of Delaware

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Honors & Affiliations

- Departmental Faculty Award for Exemplary Service, 2004
- Member, American Chemical Society, Society of Plastics Engineers, and The Fiber Society

- Polymer science
- Polymer blends
- Electrospinning
- Polymer composites

Dr. Peter Liaw

John Fisher Professor and Ivan Racheff Chair of Excellence Ph.D., Northwestern University

406 Ferris Hall

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Honors & Affiliations

- Fellow, American Society for Metals
- Haynes International Gift Funds
- Westinghouse Outstanding Performance
- Director of NSF Integrated Graduate Education and Research Traineeship (IGERT), International Materials Institutes (IMI) and Major Research Instrument (MRI) programs

- Mechanical behavior, processing and nondestructive evaluation of advanced materials, including bulk-metallic glasses, nano-structural materials, superalloys and intermetallics
- NSF Advanced Neutron Scattering Network for Education and Research (ANSWER) Program
- NSF Integrative Graduate Education and Research Traineeship (IGERT) Program



Dr. Carl Lundin

Professor Ph.D., Rensselaer Polytechnic Institute



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Honors & Affiliations

- Fellow, American Society for Materials
- Fellow, American Welding Society
- Director of Materials Joining
- Director of High Temperature Piping
 Inspection Laboratory
- International Institute of Welding (IIW). Invited Lecture, "Houdremont Lecture", Annual Assembly, July 2012
- International Institute of Welding (IIW), The Evgeny Paton Prize for Contributions to Joining Science and Technology through his lifetime of dedication to applied research and development in the field of Materials Joining, July 2010
- Materials Properties Council, Chairman Fabrication Committee

- Materials Joining, Metallurgy, High Temperature Behavior
- New High Strength Steels
- Corrosion of Weldments
- Stainless Steels for the Nuclear and Chemical Industries

Dr. David Mandrus

Professor Ph.D., Stony Brook University

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Honors & Affiliations

- Fellow, American Physical Society
- UT-Battelle Scientific Research Award, 2009
- Member, Superconductor Science and Technology Advisory Board
- Joint Faculty, Materials Science and Technology Division, ORNL

Research Areas

 Growth, discovery and materials physics of new electronic and magnetic materials (e.g. superconductors, thermoelectronics, multiferroics and itinerant magnets); oxide electronics

Dr. Carl McHargue

Research Professor Ph.D., University of Kentucky

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Honors and Affiliations

- REI Medal by International Committee, Radiation Effects in Insulators, 2006
- Distinguished Service Award, The Minerals, Metals and Materials Society, 2001

Research Areas

- Ion implantation of ceramics-radiation damage
- Mechanical and optical properties of defects and nanostructures in ceramics

Dr. Thomas Meek Associate Professor

Ph.D., The Ohio State University

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Honors & Affiliations

- Member, American Ceramic Society
- SAMPE (executive board member 2001-2002)

- Electronic properties of materials
- Microwave processing of materials
- Ultrasonic processing of materials

Dr. Chuck Melcher

Research Professor and Director, Scintillation Materials Research Center Ph.D., Washington University, St. Louis



301 Science and Engineering Research Facility Scintillation Materials Research Center The University of Tennessee Knoxville, TN 37996-2100 Tel: (865) 974-0254 Email: *cmelcher@utk.edu*

Honors & Affiliations

- Fellow, IEEE, 2014
- Citation for Success in Multidisciplinary Research: University of Tennessee, 2013
- Associate Editor: Conference proceedings of Inorganic Scintillators and their Applications, 2009
- Senior Editor: Conference proceedings of Inorganic Scintillators and their Applications 2007
- Merit Award: IEEE Nuclear and Plasma Sciences Society, 2006
- Associate Editor, *Transactions on Nuclear* Science (2004 – 2010)

- Discovery and development of new scintillation materials that will form the basis for the next generation of gamma-ray, x-ray and neutron detectors
- Characterization of new luminescent materials via optical and x-ray spectroscopy
- Implementation of emerging scintillator technology in medical imaging systems, homeland security inspection systems, neutron and particle physics experiments and remote sensing

• Single crystal growth and powder synthesis of novel scintillation materials

Dr. James Morris

Associate Professor and UT-ORNL Joint Faculty Ph.D., Cornell University

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Oak Ridge National Laboratory Oak Ridge, TN 37831-6115 Tel: (865) 576-7094, Fax: (865) 576-6298

Honors & Affiliations

- Departmental Excellence in Teaching Award, 2012
- Organizer, "Defects, Defect Interactions, and Damage in Structural Materials," Energy Frontier Research Center Summer School, 2012
- Deputy Director, Department of Energy "Energy Frontier Research Center for Defect Physics", 2010-present
- Chair, Chemistry and Physics of Materials Committee, TMS Society, 2005-2008
- Visiting associate professor, CNRS, Ecole des Mines, Nancy Cedex, France, June 2005

Research Areas

• Crystal nucleation and interfacial free energies

- Metallic glasses
- Defect structures and material behavior
- Ductility of B2 compounds
- Martensitic transformations and shapememory materials
- Grain boundary structure and behavior
- Large-scale molecular dynamics simulations

Dr. Tai-Gang Neih

Professor Ph.D., Stanford University

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Honors & Affiliations

- Fellow, ASM International
- Fellow, Minerals, Metals and Materials Society
- Editor, Materials Letters
- Adjunct Professor, WPI-Tohoku University
- Consulting Professor, Hong Kong City University, University of Science and Technology – Beijing
- Editor-in-Chief, J. Intermetallics

- Mechanical behavior of complex alloys, including amorphous alloys and high entropy alloys
- Structural nanomaterials
- High temperature materials

Dr. George Pharr

Chancellor's Professor; John McKamey Professor; and Director, Joint Institute for Advanced Materials UT-ORNL Joint Faculty Ph.D., Stanford University



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Honors & Affiliations

- Member, National Academy of Engineering
- Fellow, Materials Research Society
- Fellow, ASM International
- Innovation in Materials Characterization Award, MRS, 2010
- Humboldt Senior Scientist Award, 2007
- Bradley Stoughton Award for Young Teachers of Metallurgy, ASM, 1985

Research Areas

- Nanoindentation and nanomechanical testing
- Thin film and small-scale mechanical behavior
- Mechanisms of fracture and flow in solids
- Finite element modeling of indentation contact



Graduate Degree Programs

Dr. Philip Rack

Professor and Leonard G. Penland Chair Ph.D., University of Florida

320 Ferris Hall Department of Materials Science and Engineering The University of Tennessee Knoxville, TN 37996-2100 Tel: (865) 974-5344 Email: *prack@utk.edu*



Honors & Affiliations

- Member, AVS, and Thin Film Division Executive Committee
- 2012 University of Tennessee COE Research Fellow Award
- 2011 Chancellor's Award for Research and Creative Achievement
- 2011 COE Allen & Hoshall Engineering Faculty Award

- Combinatorial thin film synthesis for rapid materials discovery
- Materials integration and nanofabrication for advanced device application
- Nanoscale focused electron beam stimulated processing



Dr. Claudia Rawn

Associate Professor and Director, Center for Materials Processing Ph.D., University of Arizona

331 Ferris Hall Department of Materials Science and Engineering The University of Tennessee Knoxville, TN 37996-2100 Tel: (865) 974-5340 Email: crawn@utk.edu



Honors & Affiliations

- Member, U.S. National Committee for Crystallography
- UTK Faculty Award for Environmental Leadership, 2012
- MSE Faculty Award for Excellence in Service, 2012
- MSE Faculty Award for Excellence in Teaching, 2008
- COE Outstanding Faculty Advisor, 2007
- MSE Outstanding Young Faculty Researcher, 2005
- Member, American Crystallographic Association, Neutron Scattering Society of America
- Fellow, ASM International

- Neutron and X-ray powder diffraction
- Small molecule crystallography
- Ceramic synthesis
- Structure/property relations

Dr. Michael L. Simpson

Professor and UT-ORNL Joint Faculty Ph.D., University of Tennessee

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Honors & Affiliations

- Fellow, IEEE, AIMBE
- Battelle Memorial Institute Distinguished
 Inventor, 2007
- Kermit Fischer Environmental Award, 1998
- Lockheed-Martin Energy Research
 Corporation
- Medal for Excellence in Technical Achievement, 1997 and 1998

- Molecular-scale engineering and nanoscale technologies
- Nanophase materials sciences



Dr. Shanfeng Wang

Associate Professor Ph.D., The University of Akron

424 Ferris Hall Department of Materials Science and Engineering The University of Tennessee Knoxville, TN 37996-2100 Tel: (865) 974-7809 Email: *swang16@utk.edu*



Honors & Affiliations

- Overseas Scholars Collaborative Research Award, National Natural Science Foundation of China, 2014
- International Collaborative Research Award, Ministry of Science and Technology of China, 2009
- Guest Professor, East China University of Science and Technology, Shanghai, 2008-present
- Member, Society of Rheology, American Physical Society, American Chemical Society, Society for Biomaterials, and American Institute of Chemical Engineers

- Rational design, synthesis, physical properties and processing of polymeric biomaterials for various tissue engineering applications
- Smart biomaterials such as shape memory polymers, biomimetic or bionic polymer/ nanocomposite systems for medical applications
- Fabrications of biodegradable scaffolds and microfluidics, and effects of material properties and scaffold features on in vitro cell responses and in vivo tissue growth
- Cancer therapy and gene therapy based on polymeric nanoparticle carriers.

Dr. William Weber Governor's Chair Professor Ph.D., University of Wisconsin

201 TANDEC Building Department of Materials Science and Engineering The University of Tennessee Knoxville, TN 37996-1950 Tel: (865) 974-0415 E-mail: *wjweber@utk.edu*



Honors & Affiliations

- Pacific Northwest National Laboratory Director's Award for Individual Lifetime Achievement in Science and Technology, 2009
- University of Wisconsin, Oshkosh, Distinguished Alumni Award, 2009
- Fellow, Materials Research Society, American Association for the Advancement of Science, American Ceramic Society, American Physical Society

- Interaction of radiation with solids
- Radiation effects in materials
- Ion-beam modification of materials
- Materials under extreme environments
- Nuclear materials



Dr. Haixuan Xu

Assistant Professor Ph.D., University of Florida

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Honors & Affiliations

- Fellowship, Center of Defect Physics in Structural Materials
- Member, American Physical Society
- Member, Materials Research Society
- Member, The Minerals, Metals and Materials Society

Research Areas

- Point defect evolution and impurity segregation in advanced alloys with improved strength, stability and radiation resistance
- Defect-dislocation interaction and dislocation dynamic behavior in materials under external stimuli
- Interface effects on flexoelectricity in nanoscale sensors, actuators, and energy harvesters



Graduate Degree Programs

Dr. Yanwen Zhang Associate Professor and UT-ORNL Joint Faculty Ph.D., Lund University, Sweden

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Honors & Affiliations

 Co-chair, International Conference on Radiation Effects and Insulators, 2010



- Presidential Early Career Award for Scientists and Engineers (PECASE)
- DOE Office of Science Early Career Scientist and Engineer Award
- Co-editor, Ion Beams in Nanoscience and Technology

Research Areas

 Interactions of charged particles with materials, detection and characterization of charged particles including ion-solid, electron-solid and photon-solid interaction



Faculty by Specialty Area

Advanced Structural Materials

- Dr. George Pharr
- Dr. Hahn Choo
- Dr. Yanfei Gao
- Dr. Easo George
- Dr. Peter Liaw
- Dr. Carl Lundin
- Dr. James Morris
- Dr. T.G. Nieh
- Dr. Kurt Sickafus

Computational Materials Science

- Dr. Gerd Duscher
- Dr. Yanfei Gao
- Dr. James Morris
- Dr. David Keffer
- Dr. William Weber
- Dr. Haixuan Xu

Electrical, Optical and Magnetic Materials

- Dr. Takeshi Egami
- Dr. Bin Hu
- Dr. Veerle Keppens
- Dr. David Mandrus
- Dr. Thomas Meek
- Dr. Chuck Melcher
- Dr. Philip Rack

Materials for Energy Applications

- Dr. Hahn Choo
- Dr. Gerd Duscher
- Dr. Takeshi Egami

- Dr. Easo George
- Dr. David Joy
- Dr. Ramki Kalyanaraman
- Dr. David Keffer
- Dr. Veerle Keppens
- Dr. Carl McHargue
- Dr. T.G. Nieh
- Dr. Claudia Rawn
- Dr. David Mandrus
- Dr. James Morris
- Dr. Kurt Sickafus
- Dr. William Weber
- Dr. Yanwen Zhang

Nanomaterials and Devices

- Dr. George Pharr
- Dr. Philip Rack
- Dr. Ramki Kalyanaraman
- Dr. Claudia Rawn
- Dr. Michael Simpson
- Dr. Shanfeng Wang
- Dr. Yanwen Zhang

Polymers and Biomaterials

- Dr. Roberto Benson
- Dr. Gajanan Bhat
- Dr. Wei He
- Dr. Bin Hu
- Dr. David Keffer
- Dr. Kevin Kit
- Dr. Michael Simpson
- Dr. Shanfeng Wang



Admissions Requirements

Please submit a request for application by email to the departmental graduate recruiting coordinator at *mse@utk.edu* or visit the web page to download forms. Academic, research, and work backgrounds of prospective students will be reviewed to check that a good match exists between prospective students and the department to ensure students have a satisfying and rewarding graduate career.

All students interested in the College of Engineering graduate program must first be admitted through the UT Graduate School. Applications are available online at *http:// admission.utk.edu/graduate/*.

Graduate Record Examination (GRE) scores (verbal, quantitative and analytical) are also required for admission consideration for all graduate student applicants (domestic and international) in the programs.



Financial Support

Graduate students may receive financial support through the MSE department or through assistantships and fellowships administered through the MSE department.

Contact Information

Graduate Program Coordinator Department of Materials Science and Engineering The University of Tennessee 414 Ferris Hall, 1508 Middle Drive Knoxville, TN 37996-2100 Tel: (865) 974-5336 E-mail: *mse@utk.edu* Web site: *www.engr.utk.edu/mse*

THE UNIVERSITY of TENNESSEE

KNOXVILLE

Department of Materials Science & Engineering COLLEGE OF ENGINEERING

Department of Materials Science and Engineering

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