UNT UNIVERSITY OF NORTH TEXAS

Surface Science and Engineering

Surface science and engineering — the study of surfaces and their structural properties — engages innovative research across the engineering and science disciplines. UNT researchers are developing leading edge, interactive programs in this area, with critical impact for current and next-generation applications such as nanodevices, radiation detection, aircraft components, and advanced coatings and surface texturing for hard tissue bioimplants. Novel approaches, from atomic to macro scale, are used to design new materials, arrest degradation, enhance performance, improve sustainability, and extend the lifetime of nanoscale materials and devices. UNT offers equal strengths in both experimental and computational research, with an extensive infrastructure and knowledge base to support both areas and sub-disciplines, with superior results.

- **UNT has one of the most advanced university research facilities in the nation for the cross-disciplinary analysis of materials. Innovative research base combines surface science and multi-scale engineering for materials synthesis and analysis, from atomic to macro scales**
- **Close interaction with the materials modeling program to advance experimental research**
- **Active research partnerships with distinguished collaborators such as the Department of Defense, Los Alamos National Laboratory, and the Semiconductor Research Corporation (SRC), including a UNT based, SRC supported, multi-university research center focusing on electronic materials processing and integration**
- **At the forefront of jet engine research and experimentation using advanced characterization, simulation and modeling of aerospace components and materials**

Representative Faculty

Raj Banerjee, Director of the Center for Advanced Research and Technology; and Professor of Materials Science and Engineering: *titanium and its alloys; nickel base superalloys; metal matrix composites; and nanostructured thin films*

Oliver Chyan, Professor of Chemistry: *analytical and materials chemistry, including semiconductor photoelectrochemistry; and novel materials for alternative energy production and fuel cells*

Narendra Dahotre, Chair and Professor of Materials Science and Engineering: *laser materials interactions and laser surface engineering; and biomaterials*

Aleksandra Fortier, Assistant Professor of Mechanical and Energy Engineering: *stress analysis and thin films*

Jeffry Kelber, Director of the Center for Electronic Materials Processing and Integration; and Regents Professor of Chemistry: *thin film deposition; plasma processing of surfaces; and the development of novel electronic materials for beyond-Si devices*

Arup Neogi, Professor of Physics: *quantum dots; plasmonic nanomaterials; ultrafast optical spectroscopy; and biophotonics*

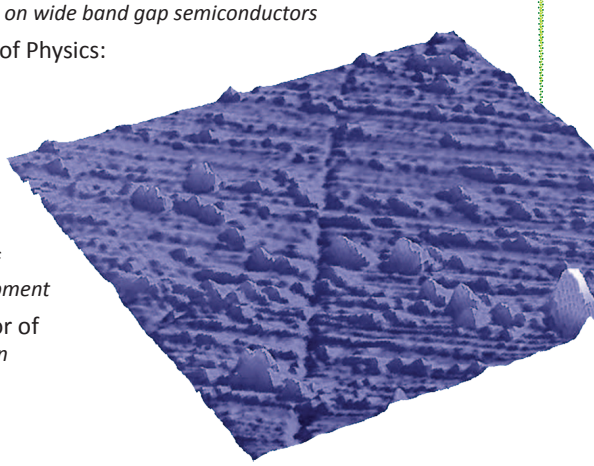
Mohammad Omary, Professor of Chemistry: *molecular photonics and the surface absorption of transition metal compounds on wide band gap semiconductors*

Bibhudutta Rout, Assistant Professor of Physics: *materials analysis and microfabrication*

Thomas Scharf, Associate Professor of Materials Science and Engineering: *surface engineering of nanostructural materials, including solid lubricant, ceramic, and metallic thin films*

Guido Verbeck, Assistant Professor of Chemistry: *analytical instrument development*

Duncan Weathers, Associate Professor of Physics: *experimental ion-solid interaction*



UNIVERSITY OF NORTH TEXAS 1155 Union Circle #310979; Denton, Texas 76203-5017; research.unt.edu

Select Research Resources

CART: Center for Advanced Research and Technology
research.unt.edu/cart

CART is one of the most advanced university facilities in the nation for research involving materials synthesis and analysis, from atomic to macro scales. CART features sophisticated equipment used for true 3-D characterization, processing, and cross-disciplinary analysis. A new NSF funded, university Nanofabrication Analysis and Research Facility provides an adjoining clean room so that materials can be synthesized, tested, and transferred in close proximity under controlled conditions, creating a powerful combination of capabilities in one location.

ISES: Institute for Science and Engineering Simulation
research.unt.edu/ises

ISES uses advanced characterization, simulation and modeling of aerospace components and materials to maintain and extend the life of aging U.S. Air Force aircraft, prevent catastrophic engine failure, and aid the Air Force in developing better materials for the next generation of aircraft.

CEMPI: Center for Electronic Materials Processing and Integration
research.unt.edu/cempi

CEMPI studies advanced plasma processes and insulators used in manufacturing state-of-the-art semiconductor chips, with a mission to increase performance. The center is jointly funded by UNT and the Semiconductor Research Corporation (SRC), the world's leading industry consortium for research in semiconductors and related technologies.

LMMA: Laboratory for Moving Mechanical Assemblies
www.mtse.unt.edu/LaMMA

Research activities support the synthesis and processing of thin films and laser processed bulk composites; characterization; and interrelationships of ceramic, metallic and polymeric materials and their composites.

Surface Science Laboratory
www.chem.unt.edu/research/centers/ssl

Research investigates atomic level understanding and control of chemistry at surfaces and interfaces in various environments, including ultra-high vacuum (UHV), high pressure, gas phase environments, and aqueous solutions, with applications in microelectronics fabrication, nanocatalysis, and corrosion.

Laboratory of Imaging Mass Spectrometry
www.chem.unt.edu/facilities/UNTLIMS/index.htm

A service facility for the local, national, and international academic and commercial research community, the lab offers a suite of mass spectrometry and imaging instruments, with applications in chemistry, toxicology, environmental, forensic, and materials science.

The Bone and Joint Research Center, UNT Health Science Center
www.hsc.unt.edu/departments/orthopaedics/boneandjointcenter.cfm

The interdisciplinary center facilitates collaborations within its system and with national and international institutions. BJRC houses state-of-the-art equipment for experimental and computational studies in areas including tissue mechanics, multi-scale modeling and biomaterial evaluation.

Contributing Research Clusters:

Materials Modeling
mmrc.unt.edu

Multi-scale Surface Science and Engineering
surfaces.unt.edu

Renewable Bioproducts
renewableproducts.unt.edu