A Call to Collaborate

Partner with U.Va. faculty conducting exciting engineering research in:

- Corrosion
- Cell Signaling
- Applied Biomechanics
- Terahertz Spectrum
Join Us

The School of Engineering and Applied Science at U.Va. is celebrating its 175th birthday in 2011 — and one way to celebrate is to invite you to join us in the exciting research we have under way here. We have assembled teams of highly regarded researchers in such fields as corrosion, cell signaling, applied biomechanics and the terahertz spectrum, but we know that additional collaborations can lead this research in new and productive directions.

Accordingly, we are making an unusual request: TEAR THIS BOOKLET APART! Send the research group descriptions to your faculty members who share these interests, and together we may spark collaborations that will benefit both schools.

Sincerely,

JAMES H. AYLOR
Louis T. Rader Professor and Dean
School of Engineering and Applied Science
University of Virginia
The U.Va. Center for Electrochemical Science and Engineering (CESE) is one of the premier academic corrosion research groups in the world. Through our research, we hope to expand both the fundamental knowledge base and the applied toolset for corrosion mitigation, corrosion-informed material design and damage prognosis.

The center consists of six core faculty members, approximately 25 students, and five postdoctoral research associates.

Since its founding in 1969, CESE students have earned more than 150 graduate degrees.

CENTER THRUST AREAS
• Localized corrosion
• Environment-assisted cracking
• Electrodeposition
• High-temperature oxidation

GROUP MEMBERS
Unless otherwise noted, CESE members are faculty of the Department of Materials Science and Engineering.

RECENT RESEARCH DEVELOPMENTS

• Accelerated corrosion test methods for improved material selection decisions and material development
• Enhancements to current service life prediction methodologies for aircraft

RECENT GRANTS

• “Development and Validation of an Integrated Intergranular Corrosion/Cracking Model of Al-Mg Alloys for Naval Applications,” Office of Naval Research, PIs: Kelly, Scully and Gangloff
• “Collaborative University Research on Corrosion,” Office of the Undersecretary of Defense for Acquisition and Logistics, PIs: Scully, Kelly and Gangloff
• “Structure-Property Correlation in Electrochemically Deposited Co-Pt Alloys Films, Micro- and Nanostructures,” National Science Foundation, PI: Zangari
• “Mechanism Based Modeling of Hydrogen Environment Assisted Cracking in High Strength Alloys for Marine Applications,” Office of Naval Research, PIs: Scully and Gangloff

FACILITIES/EQUIPMENT

• State-of-the-art facility for high-resolution crack growth in materials under ultrahigh vacuum, high temperature and controlled atmospheric conditions, including full immersion.
• Controlled corrosive atmospheres, including UV light, gaseous contaminants and salt spray
• Thermal desorption spectroscopy for measuring hydrogen content in materials

COLLABORATORS

Our external collaborators include:

• NASA/Langley
• National Institutes of Standards and Technology
• Naval Research Laboratory
• Ohio State University
• Southwest Research Institute
• University of Hawaii
• University of Southern Mississippi
• University of Utah
• University of Wisconsin
• U.S. Air Force Academy

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Visit Us Online: www.virginia.edu/cese.
Cellular Signal Transduction Research in the U.Va. Department of Biomedical Engineering

Over the past decade, the Department of Biomedical Engineering has built a highly productive research group in cellular signal transduction. Group members apply quantitative engineering approaches to fundamental cell-signaling problems in cancer, infectious disease and various cardiovascular disorders. Faculty expertise includes mechano-transduction, tissue remodeling, systems metabolism, and live-cell/whole-animal imaging, among other areas.

THRUST AREAS

• Computational systems bioengineering of cell signaling
• Vascular signaling responses to shear stress and microenvironmental stimuli
• Signaling deregulation in cancer initiation and progression

GROUP MEMBERS

All faculty are members of the U.Va. Department of Biomedical Engineering.

RECENT RESEARCH DEVELOPMENTS

- “Synergy between CaMKII substrates and β-adrenergic signaling in regulation of cardiac myocyte Ca2+ handling,” published in *Biophysical Journal*
- “Plectin-1 as a novel biomarker for pancreatic cancer,” published in *Clinical Cancer Research*
- “Pairwise network mechanisms in the host signaling response to coxsackievirus B3 infection,” published in *Proceedings of the National Academy of Sciences*
- “Atheroprone hemodynamics regulate fibronectin deposition to create positive feedback that sustains endothelial inflammation,” published in *Circulation Research*
- “Systems analysis of small signaling modules relevant to eight human diseases,” published in *Annals of Biomedical Engineering*

RECENT GRANTS

- “Quantitative Analysis of cAMP Compartmentation in Heart,” NIH/NHLBI, PI: Saucerman
- “Development of Molecularly Targeted Imaging Agents for KRAS Activity in Vivo,” NIH/NIBIB, PI: Kelly
- “Systems Analysis of Burkholderia cenocepacia in Polymicrobial Disease,” Cystic Fibrosis Research Foundation, PI: Papin
- “Therapeutic S1P Drug Targets for Cranial Bone Repair,” NIH/NIDCR, PI: Botchwey

FACILITIES/EQUIPMENT

- VisEn imaging system for noninvasive small-animal imaging by fluorescence molecular tomography
- Custom dual two-photon + total internal reflection microscope
- Microcomputed tomography scanner for in vivo imaging of radiopaque tissues
- Endothelial Cell Culture Facility for isolating and culturing primary endothelial cells

COLLABORATORS

Our external collaborators include individuals at Cornell University, Dana Farber Cancer Center, Harvard Medical School, the Helmholtz Center Munich, Johns Hopkins University, Laval University, LifeNet Health, Piedmont Heart Institute, Texas A&M University, University of British Columbia, University of Connecticut Health System, Universidad Nacional de Colombia, University of North Carolina — Chapel Hill, Wageningen University, Yale University.

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The Center for Applied Biomechanics (CAB) is the world’s largest university-based research center studying the biomechanics of injury. It has earned an international reputation for its ongoing research and education in impact biomechanics, computational mechanics, vehicle crashworthiness and crash dummy development.

Our multidisciplinary team brings together 50 engineers, physicians, public health professionals and biostatisticians from across the University of Virginia.

**CENTER THRUST AREAS**

- Injury biomechanics
- Automobile safety
- Blast and ballistics protection
- Sports biomechanics

**GROUP MEMBERS**

* CAB members are faculty of the U.Va. Department of Mechanical and Aerospace Engineering.*

RECENT RESEARCH DEVELOPMENTS

• Formulated an international standard for pedestrian dummy requirements
• Improved restraints for an aging occupant population
• Developed specifications for military helmet design

RECENT GRANTS

• Global Human Body Modeling Consortium Centers of Expertise on the Thorax, Pelvis, Extremities
• National Highway Traffic Safety Administration Grant on the Biomechanics of Injury and Investigation of Rollover Crashes
• Crash Injury Research Engineering Network to Investigate Real-World Crashes
• Defense Medical Research and Development Award for Investigating the Injuries to Armored Vehicle Personnel Subject to Blast

FACILITIES/EQUIPMENT

• New state-of-the-art 30,000-sq.-ft. laboratory
• Dynamic rollover system for full vehicles
• Feedback-controlled high-speed sled system
• High-speed motion capture and data acquisition systems

COLLABORATORS

Our external collaborators include:

• Hongik University
• University of Alabama — Birmingham
• University of Michigan
• University of Navarra
• University of Pennsylvania
• U.S. Army Aeromedical Research Laboratory
• U.S. Department of Defense
• U.S. Department of Transportation

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Visit Us Online: www.centerforappliedbiomechanics.org.
The U.Va. Center for Advanced Submillimeter-Wave Technology is one of the foremost academic research groups in the world dedicated to developing this underutilized and largely unexplored region of the electromagnetic spectrum. It comprises three research laboratories: the Far-Infrared and THz Receiver Lab, the U.Va. Microfabrication Lab, and the Micromachined RF Technology Lab. Research under way here is having a broad impact on a variety of scientific endeavors, ranging from radio astronomy and molecular spectroscopy to high-resolution imaging and sensing for security applications.

**CENTER THRUST AREAS**
- High-speed semiconductor and superconductor devices
- Automobile safety
- RF micromachining and microelectromechanical devices
- Terahertz spectroscopy
- Submillimeter-wave metrology

**GROUP MEMBERS**
Unless otherwise noted, all faculty are members of the Charles L. Brown Department of Electrical and Computer Engineering.

Standing: Boris Gelmont, Tatiana Globus, Arthur Lichtenberger and Scott Barker.
Seated: Bascom Deaver (Physics) and Robert Weikle.
**RECENT RESEARCH DEVELOPMENTS**

Our group has developed the first set of on-wafer measurement probes operating in the 500 to 750 GHz region to allow direct, in-situ characterization and diagnostics of planar terahertz devices, including heterostructure field effect and bipolar transistors.

**RECENT GRANTS**

- “Submillimeter-Wave Device Fabrication and Support,” U.S. Army National Ground Intelligence Center, PIs: Weikle and Deaver
- “RF-MEMS Phase Modulators for Millimeter-Wave Polarimeter Arrays,” National Science Foundation, PI’s: Barker and Lichtenberger

**FACILITIES/EQUIPMENT**

- State-of-the-art laboratories housing far-infrared lasers, network analyzers, and other instrumentation for characterizing high-speed integrated circuits operating from radio frequencies to 2.5 THz
- Cryogenic and room-temperature probe stations for on-wafer measurements of planar devices and circuits from DC to 750 GHz
- Processing and diagnostic equipment, including RF sputtering systems, reactive ion etchers, and deep-UV lithography for fabricating submicron-scale semiconducting and superconducting devices and integrated circuits

**COLLABORATORS**

Our external collaborators include:

- Caltech
- Harvard-Smithsonian Center for Astrophysics
- National Radio Astronomy Observatory
- Northrop Grumman Aerospace Systems
- Teledyne Scientific
- University of Arizona
- University of California — San Diego
- University of Massachusetts
- University of Tennessee
- Virginia Diodes, Inc.

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From the very start, Rice Hall, the Engineering School's upcoming information technology engineering building, was conceived as a hub for collaboration. It will energize research already under way and stimulate projects that are even more innovative by bringing faculty members from computer sciences more closely together with colleagues from electrical and computer engineering.

Rice Hall will also help the Engineering School make collaboration an essential element of the undergraduate experience. In its fully equipped workshops, students taking Introduction to Engineering classes will be able to collaborate more effectively than ever before on their design problems. And the building itself, equipped with advanced heating, cooling, lighting and energy recovery systems, will serve as a test bed for collaborative research at the intersection of information technology engineering and sustainable building design.

By bringing people together, Rice Hall will enable the Engineering School to pursue a more advanced research agenda and better prepare the next generation of engineers to contribute to the well-being of society.
IMpact
A Call to Collaborate

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