

Research Expenditures

Our research expenditures have more than doubled in 5 years and tripled over 10 years! In fiscal year 2010 our expenditures reached the unprecedented level of ~\$4.3 million. Projections for 2011 are for ~ \$4.8 million. In 2010 we published over 50 peer-reviewed journal articles (15 more are in press) and we have been awarded 5 patents.

As we continue to engage in research, **our undergraduate enrollment has reached the all-time record of 400 students!** Our graduate student population has also grown to new heights. In 2010 we graduated 8 Ph.D., 3 M.S., and 45 B.S. in Chemical Engineering and 3 M.S. in Bioengineering.

In the pages below we highlight awards received by our students, alumni, and faculty, a few recent publications, and some newly awarded research grants.

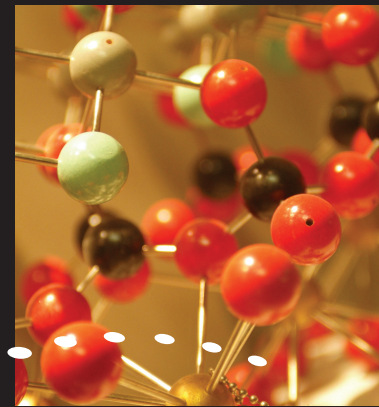
We invite you to look for updates in our website:

<http://cbme.ou.edu>

Yours sincerely,
Lance Lobban, Director

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CBME 2010 Achievements

Chemical, Biological and Materials Engineering



The University of Oklahoma

Dear Colleagues,

All the faculty members of the School of Chemical, Biological and Materials Engineering of the University of Oklahoma, Norman campus, wish you and your colleagues happy holidays and a fantastic 2011!

2010 has been generous to our department, and we would like to share with you our enthusiasm.

The National Research Council (NRC) has completed its assessment



Dr. Lance Lobban, director

of the graduate programs. Accustomed to definite rankings (the previous NRC assessment placed our program 54th), we were surprised by the new format. However, we are delighted by the results! Each graduate program was ranked according to survey-based (S) and to regression-based (R) criteria. According to T.A. Barbari, the S ranking is substantive, while the R criteria reflect the peers' perception (*Chemical and Engineering News*, October 4th, 2010, page 5).

The S ranking placed our graduate program, with 90% probability, between the 21st and 55th position, while the R ranking left us between the 45th and 74th place. Even though this confirms that our reputation lags behind our program's real value, it should be remembered that the NRC report is based on 2005-2006 data. Since then we have made further progress by hiring exceptional new faculty members, increasing research expenditures, and continuing with strong publications!

Student Awards

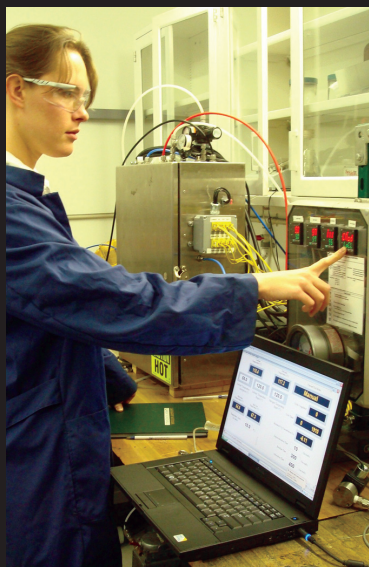
Our students continue to attract nation-wide attention for their research. Particularly, in 2010:

Linden Heflin-Down, Khoa Bui, Dimitrios Argyris, and Naga Rajesh Tummala were awarded one *American Heart Association (AHA) Pre-Doctoral Fellowship* for the project titled 'Transient Occlusions Associated with Renal Artery Aneurysms as a Cause of Renovascular Hypertension', the *Explorations in Science through Computation Student Award*, one *2010 Graduate Student Award in Computational Chemistry* from the Theoretical Chemistry Subdivision of the American Chemical Society, and one *Faraday Discussion – Graduate Student Seminar Fellowships*, respectively.

Alumni in the Spotlight

Our alumni make us proud. This year we highlight two recent graduates: Dr. Holly Krutka and Dr. Edgar Acosta.

Dr. Holly Krutka, Ph.D. 2007, now at ADA Environmental Solutions, Inc., is the Technical Leader for the project 'Evaluation of Solid Sorbents as a Retrofit Technology for CO₂ Capture', funded by the U.S.



Dr. Holly Krutka

Department of Energy (\$15 million plus \$3.75 million from cost-share partners).

Dr. Edgar J. Acosta, Ph.D. 2003, now at the University of Toronto, received the 2010 Young Scientist Research Award from the American Oil Chemists' Society.

Publications

Another productive year! Out of over 50 publications, let us highlight a few collaborative efforts and review articles authored by our students and faculty:

● *Solid Nanoparticles that Catalyze Biofuel Upgrade Reactions at the Water/Oil Interface*, S. Crossley, J. Faria, M. Shen, and Daniel E. Resasco, *SCIENCE* 327 (2010) 68-72.

● *Prediction of Protein Solubility in Escherichia coli Using Logistic Regression*, A.A. Diaz, E. Tomba, R. Lennarson, R. Richard, Miguel J. Bagajewicz, and Roger G. Harrison, *BIOTECHNOLOGY AND BIOENGINEERING* 105 (2010) 374-383.

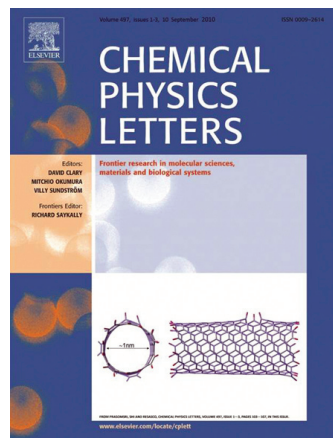
● *Recent Developments Concerning the Dispersion of Carbon Nanotubes in Polymers*, Brian P. Grady, *MACROMOLECULAR RAPID COMMUNICATIONS* 31 (2010) 247-257.

● *Introducing Decision Making Under Uncertainty and Strategic Considerations in Engineering Design*, G. Kosmopoulou, C. Jog, M. Freeman, and Dimitrios V. Papavassiliou, *CHEMICAL ENGINEERING EDUCATION* 44 (2010) 267-273.

● *Local Velocity and Stress Fields within 3D Porous Scaffolds Used in Perfusion Bioreactors for Bone Tissue Growth*, R. Voronov, S. VanGordon, Vassilios I. Sikavitsas, and Dimitrios V. Papavassiliou, *JOURNAL OF BIOMECHANICS* 43 (2010) 1279-1286.

● *Sol-Gel Prepared Nanoscopic Metal Fluorides - a New Class of Tunable Acid-Base Catalysts*, S. Wuttke, S.M. Coman, J. Kröhnert, Friederike C. Jentoft, E. Kemnitz, *CATALYSIS TODAY* 152 (2010) 2-10.

● *Lateral Confinement Effects on the Structural Properties of Surfactant Aggregates: SDS on Graphene*, N.R. Tummala, Brian P. Grady, and Alberto Striolo, *PHYSICAL CHEMISTRY CHEMICAL PHYSICS* 12 (2010) 13137-13143.



Research Grants

As we continue to grow, we thank the various funding agencies for their continued support through the following new research grants:

● Center for Interfacial Reaction Engineering (CIRE), supported by the *Department of Energy* with a \$2,930,000 grant over 3 years. CIRE is directed by Resasco, Harwell, Jentoft, Wang, and Gasem. The *Department of Energy* continues to fund, with a new \$956,000 grant, the Carbon Nanotube Technology Center (CANTEC). CANTEC is led by Resasco and several others.

● The *Advanced Energy Consortium* awarded a team composed of Resasco, Harwell, Shiau, and Papavassiliou \$245,000 over 2 years for the project titled 'Interfacially Active SWNT/Silica Nano-Hybrids'.

● Schmidtke, with Glatzhofer, and Striolo were awarded \$327,300 and \$238,052, respectively, from the *National Science Foundation* for the two 3-year-long projects titled 'Polyethylenimine Redox Polymers for Bioelectrocatalysis' (Schmidtke) and 'The Emergent Behavior of Solid Nanoparticles at Oil-Water Interfaces: A Multi-Scale Thermodynamic Approach to Enable Bio-Oil Upgrade' (Striolo).

● The *Oklahoma Center for the Advancement of Science and Technology (OCAST)* awarded Heintelman \$75,000 over 2 years, for the project 'Biopharmaceutical Catalysts for Alzheimer's Disease Therapy'.

● O'Rear received \$91,197 from the *Department of Transportation – FHA* (subcontract through Oklahoma State University) for the project 'WMA Pavements in Oklahoma: Moisture Damage and Performance Issues'.

● The American Heart Association awarded Nollert \$150,000 for his 2-year-long project 'Development of a Small Diameter Vascular Graft Using the Amniotic Membrane'.

● Our faculty was involved in two Major Research Instrumentation grants received from the *National Science Foundation*: \$533,000 for the project 'Acquisition of a Field-Emission Scanning Electron Microscope' led by Johnson, Altan, Resasco, Russell, and Schmidtke, and \$729,925 for the project 'Acquisition of Extensible Petascale Storage for Data Intensive Research' led by Neeman (Papavassiliou was a member of the team).

Faculty Development

Solar year 2010 was generous to our deserving faculty:

● John F. Scamehorn was awarded the Surfactant Detergent Division 2010 Distinguished Service Award from the American Oil Chemists' Society.

● Brian P. Grady was elected Secretary of the Society of Plastics Engineers.

● Ed O' Rear received the University of Oklahoma 2010 Regents Award for Superior Research and Creative Activity.

● Friederike C. Jentoft, with Bruce C. Gates and Helmut Knözinger, edited volume No. 53 of the series *Advances in Catalysis*.

● Dimitrios V. Papavassiliou was the organizer for Area 10D, Computer and Systems (CAST), for the 2010 AIChE Annual Meeting in Salt Lake City, and was elected to the AIChE Fluid Mechanics Programming Committee until 2014.

● A. Striolo and F. C. Jentoft won 1st and 2nd prize in the College of Engineering – wide teaching competition during the College of Engineering Centennial Symposium.

● Brian P. Grady, with D. Acosta and G. Funkhouser, was awarded the U.S. Patent No. 7,718,739: Polyalkenoate cement compositions and methods of use in cementing applications.

● Roger G. Harrison, with S.E. Lind and W.Q. Ding, was awarded the U.S. Patent No. 7,807,644: Chimeric proteins with phosphatidylserine binding domains.

● Daniel E. Resasco was awarded three patents, including U.S. Patent #7,816,709: Single-walled carbon nanotube-ceramic composites and methods of use, with L. Balzano.

We welcome our newest faculty member, Assistant Professor Peter J. Heintelman.

