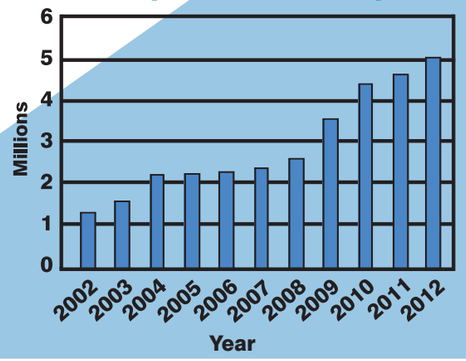
CBME
Research Expenditures, 2002 - present



Selected Research Grants

- Distributed On-Farm Bioenergy, Biofuels and Biochemicals Development and Production via Integrated Catalytic Thermolysis, $149,846, DoE/USDA **(Steve Crossley, Daniel Resasco, Richard Mallinson)**

- Catalytic Deoxydehydration of Biomass-Derived Polyols to Olefins, $425,000, National Science Foundation **(Friederike Jentoft)**

- Activated Cell Sorter, $394,343, National Science Foundation **(David Schmidtke, Vassilios Sikavitsas, Ulli Nollert)**

- International Collaboration in Chemistry: Tuning Catalyst Surfaces to Control Aldol Reactions in Biomass Conversion, $324,665, National Science Foundation **(Friederike Jentoft)**

- Pickering Emulsions for Hydraulic Fracturing, $58,170, National Science Foundation **(Alberto Striolo)**

- Effects of Thermodynamic Phase Changes at Reservoir Conditions on the Interfacial Properties of Chemicals Used in Hydraulic Fracturing, $95,183, National Science Foundation **(Jeff Harwell, Brian Grady)**

- Ventricular Assist Device, $154,428, Integris **(David Schmidtke)**

- Interfacially Active SWNT/silica nano-hybirds, $215,066, Advanced Energy Consortium, **(Daniel Resasco, Dimitrios Papavassiliou, Jeff Harwell)**

The University of Oklahoma
School of Chemical, Biological and Materials Engineering
Sarkeys Energy Center, T-301
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Norman, OK 73019-1004

CBME 2012 Achievements

Chemical, Biological and Materials Engineering

The University of Oklahoma

Dear colleagues, alumni and friends

These few pages will give you a sampling of the many activities of the students and faculty of the School of Chemical, Biological and Materials Engineering at the University of Oklahoma in CY 2012. As you will see, it was a busy and productive year.

For the sixth consecutive year, research expenditures by CBME faculty set an all-time high of $5 million in the fiscal year. Over the last decade, our research expenditures have averaged an annual increase of 14.4%, a remarkable growth rate. Although federal grant money is expected to get tighter, at the close of FY2012 our grants-in-force totaled $20.5 million, indicating strong research activity will continue.

In calendar year 2012 the CBME faculty published over 50 peer-reviewed journal articles with many more in press or accepted for publication; several book chapters; and one book. Four patents were awarded to our faculty during 2012, and several other technologies began the "tech transfer" process with invention disclosures. Virtually all these activities involved not just CBME faculty, but graduate students, undergraduates, and post-docs.

Dr. Lance Lobban, director

At the start of Academic Year 2012-2013, the number of undergraduate chemical engineering majors was down from the previous fall – but only by one! With 433 undergraduate majors, we remain at about the highest enrollment in CBME's history. We continue to enroll what we believe to be the best and brightest student body at OU, including 55 National Merit scholars and with nearly half the students in the honors program. CY2012 saw 68 students graduate with BS degrees in chemical engineering. The grad student enrollment, while still strong, decreased from the previous year (thanks to a record number of graduations – 24 MS and 9 PhD completions during CY2012). The CBME faculty is now advising around 70 graduate students in the chemical engineering or biomedical engineering programs.

Please take a few moments to read about some of the highlights of the year noted in this brochure, and I also invite you to look for updates from time to time on our website: **http://cbme.ou.edu**

Sincerely, Lance Lobban, Director

Publication and Patents CBME 2012

Book Published:

Advances in Catalysis, Volume 55, B.C. Gates and **Friederike Jentoft**, editors; Academic Press (Elsevier).

Book Chapters:

- *Electronic Spectroscopy: Ultraviolet-Visible and Near-IR Spectroscopy,* **Friederike Jentoft**, in Characterization of Solid Materials and Heterogeneous Catalysts: From Structure to Surface Reactivity, Wiley-VCH.

- *Functionalized Biomaterials for Musculoskeletal Tissue Engineering*, B.W. Engebretson and **Vassilios Sikavitsas**, in Handbook of Biomimetics and Bioinspiration, World Scientific Publishing Co.

- *Shear Forces*, J.Alvarez-Barreto, S.B. van Gordon, B.W. Engebretson and **Vassilios Sikavitsas**, in CRC Handbook of Biomedical Engineering, CRC Press.

Publications/Presentations:

- A new approach for global optimization of a class of MINLP problems with applications to water management and pooling problems, D.C. Faria and **Miguel Bagajewicz**, AIChE Journal, 58 (2012) p. 2320.

- Ru/TiO_2 Based Catalysts as Applied to the Upgrading of Bio-Oils, S.Boonyasuwat, T. Omotoso, T. Pham, **Daniel Resasco** and **Steve Crossley** (Presenter), AIChE Annual Meeting, Pittsburgh.

- Improved Stability of Ru/TiO_2 Catalysts for the Conversion of Phenolics from Bio-Oil, S. Boonyasuwat, S. Wan, **Steve Crossley,** (Presenter), **Richard Mallinson** and **Daniel Resasco**, 15th International Congress on Catalysis, Munich, Germany.

- Positron Annihilation Spectroscopy of Polystyrene Filled with Carbon Nanomaterials, S. Awad, H.M. Chen, **Brian Grady,** A. Paul, W.T. Ford, L.J Lee, Y.C. Jean, Macromolecules, 45 (2012) p. 933.

- Effect of Carbon Black Structure on Low-strain Conductivity of Polypropylene and Low-density Polyethylene Composites, A. Fathi, **Brian Grady**, K. Hatami, Polymer Engineering and Science, 52 (2012) p. 549.

- Amphiphilic Nanohybrid Catalysts for Reactions at the Water/Oil Interface in Subsurface Reservoirs, S. Drexler, J. Faria, M.P. Ruiz, **Jeff Harwell** and **Daniel Resasco**, Energy & Fuels, 26 (2012) p. 2231.

- Improved Oil Recovery by Chemical Flood from High Salinity Reservoirs – Single-Well Surfactant Injection Test, **Jeff Harwell**, SPE EOR Conference on Oil and Gas West Asia, Muscat, Oman.

- RAGE-Proteolyzing Antibodies for Alzheimer's Disease Therapy, **Pete Heinzelman**, OCAST Health Researcher Conference, OCAST, Oklahoma City.

- Evolution of carbonaceous deposits on H-mordenite and Pt-doped H-mordenite during n-butane conversion, **Friederike Jentotf**, M. J. Wulfers, G. Tzolova-Müller, J.I. Villegas, D.Y. Murzin, Journal of Catalysis, 296 (2012) p. 132.

- Catalytic Strategies for Upgrading Pyrolysis Vapors, **Richard Mallinson**, (Presenter), **Lance Lobban, Daniel Resasco**, AIChE Spring Meeting, Houston.

- Development of a Human Tissue-Engineered Blood Vessel from Adipose-Derived Stem Cells, J.A. Brennan, J.H. Arrizabalaga and **Matthias U. Nollert**, Circulation Research, 111 (2012) A360.

- Stain Resistance of Cotton Fabrics Before and After Finishing with Admicellar Polymerization, J. Hanumansetty, R.F. Maity and **Edgar O'Rear**, Appl Sci 2(1): 192-205(2012), doi:10.3390/app2010192 (invited paper for special issue "Organo-Fluorine Chemical Science")

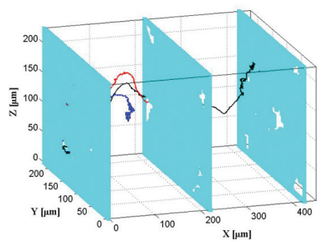
- Comparison of backwards and forwards scalar relative dispersion in turbulent shear flow, C. Srinivasan and **Dimitrios Papavassiliou**, Int. J. Heat and Mass Transfer, 55 (2012) p. 5650.

- Role of Water on the Surface-guided Growth of Horizontally Aligned Single-walled Carbon Nanotubes on Quartz, D. Shi, W. Tennyson, J.C. Kea, E. Sanchez, M.B. Johnson and **Daniel Resasco**, Chemical Physics Letters, 525-26 (2012) p. 82.

- Condensation/hydrogenation of biomass-derived oxygenates in water/oil emulsions stabilized by nanohybrid catalysts, P. Zapata, J.A. Faria, M.P. Ruiz and **Daniel Resasco,** Topics in Catalysis, 55 (2012) p. 38.

- Improving carbon retention in biomass conversion by alkylation of phenolics with small oxygenates, L. Nie and **Daniel Resasco**, Applied Catalysis A: General, 447-8 (2012) p. 14.

- The role of fibrinogen spacing and patch size on platelet adhesion under flow, A.B. Van de Walle, J. Fontenot, T.G. Spain, D.B. Brunski, E.S. Sanchez, J.C. Keay, M.E. Curtis, M.B. Johnson, T. A. Snyder and **David Schmidtke**, Acta Biomaterialia, 8 (2012) p. 4080.



- Modifying Air Fields to Improve Melt Blowing, B.R. Shambaugh, **Dimitrios Papavassiliou** and **Robert Shambaugh**, Industrial and Engineering Chemistry Research, 51 (2012) p. 3472.

- Long Term In Vivo Effect of PEG Bone Tissue Engineering Scaffolds, B.W. Engebretson and **Vassilios Sikavitsas**, Journal of Long Term Effects of Medical Implants, 22 (2012) p. 211.

Patents:

- Method and Apparatus for Producing Carbon Nanotubes, Japanese Patent No. 4,993,833, **Daniel E. Resasco**.

- Methods for Growing and Harvesting Carbon Nanotubes, European Patent No. 1904670 and Australian Patent No. 2006312250, **Daniel E. Resasco**.

- Acoustic/Pressure Wave-Driven Separation Device, US Patent No. 8,075,786, **Miguel Bagajewicz**.

- Method of Producing Carbon Nanotubes, Japanese Patent No. 4,777,518, **Daniel Resasco and Jeff Harwell**.

Of Note:

Brian Grady

- Brian Grady Elected Fellow of the Society of Plastics Engineers
- David Schmidtke named to OU Presidential Professorship
- Miguel Bagajewicz named Associate Editor/Editorial Board Member of the International Journal of Chemical Engineering
- Friederike Jentoft named Editor of Advances in Catalysis
- Dimitrios Papavassiliou named to Consulting Editors Board, AIChE Journal

Friederike Jentoft

- Dimitrios Papavassiliou Outstanding Paper Award in the Turbulence session, 9th International Conference for Heat Transfer, Fluid Mechanics and Thermodynamics
- Brian Grady elected Vice President of North American Thermal Analysis Society
- Daniel Resasco appointed Distinguished Advisory Board Member, DoE EFRC - Argonne National Lab
- Taiwo Omotoso (1st place) and Paula Zapata (3rd place) at 2012 EPSCoR Hybrid Poster Competition
- Alana Denning (chemical engineering senior) awarded 2012 OU Distinction in Undergraduate Research
- Brandon Smith (chemical engineering senior) awarded 2012 NIH National Institute of General Medical Sciences Medical Scientist Training Program grant
- Joaquin Resasco (chemical engineering senior) awarded 2012 National Science Foundation Graduate Research Fellowship
- Brent van Rite (bioengineering PhD student) awarded 2012 Graduate College Student Research and Performance Day 1st place award and McNair's Choice Award
- Graduate students Jimmy Faria, Nicholas Briggs, Brandon Engebretson, Margaret Heck, Christopher Lewis, Matthew Wulfers selected for Robert Hughes Centennial Fellowship Award
- Jimmy Faria (chemical engineering PhD student) awarded BP Graduate Student Excellence Fellowship