GALLOGLY COLLEGE OF ENGINEERING
SCHOOL OF CHEMICAL, BIOLOGICAL AND MATERIALS ENGINEERING
The UNIVERSITY of OKLAHOMA

A Welcome From The Director

I am excited to announce that the university plans to open classrooms to 100% capacity for the fall 2021 semester and that CBME classes will again meet in person.

Our new COE Dean, John Klier (who is also a chemical engineer and is introduced below), is putting his mark on the Gallogly College of Engineering. The biggest message is that COE, and CBME, are growing. Learn more about our strategic plan, which indicates we are to grow by 25% in faculty in the next five years. Other important items in the plan include diversity, equity and inclusion initiatives, as well as a projected increase in the number of engineering graduates (over a longer timescale because of the four years required to get a degree!).

In this newsletter, you will learn more about Dean Klier and also read about the generosity of one of our faculty members, Dr. Roger Harrison. We have highlighted some of the outstanding achievements of our students. We also have included a rather lengthy list of all faculty publications in refereed journals over the last year.

Finally, and most important, please feel free to drop me a line at bpgrady@ou.edu at any time, and even better, if you are in Norman, stop by for a visit!

Dr. Brian Grady
CBME Director

A Note From The Dean

Hello to the CBME community.

Allow me to share my background. I received a Bachelor of Science in chemical engineering from the Massachusetts Institute of Technology and a Master of Science and a Doctorate from Purdue University.

I spent more than 25 years in the private sector with Dow Chemical Co. in technology and technical management roles. Managerial responsibilities included leading Core R&D materials-related organizations, Dow Coating Materials research and development organization, and most recently the Performance

Invest in CBME

CBME continues to encourage giving to the Program of Excellence (POE) Scholarship fund. Please make an investment in our students.

Give to POE Scholarships

Leave a Legacy

Whether you are considering a planned gift or naming a space in CBME, there are many opportunities for you to make a lasting impact.

Reach out to our development liaison, Trish Bloemker Sowers. She will be glad to answer your questions.

Trish Bloemker Sowers

Executive Director of Development and Liaison to CBME

Email: tbsowers@ou.edu
Cell: (412) 999-9544

Materials and Chemicals divisional research, development and technical service organizations.

In 2015, I moved to the University of Massachusetts Amherst where I became head of the Department of Chemical Engineering. During this time, we grew research significantly, raised funds and renovated the undergraduate labs including a new biotechnology capability, forged partnerships with regional and national companies, and continued our focus on building an inclusive and diverse department. At the same time, like many new assistant professors, I built a research program and set up labs in the areas of functional colloids, polymers, and targeted delivery in collaboration with collaborators at UMass and beyond. In 2020, I made the move to the University of Oklahoma. I continue to maintain research programs at UMass and am building new programs at OU with the help of current and new students and postdocs.

The Gallogly College of Engineering has developed an excellent strategy reflecting the direction the faculty, staff and stakeholders wish to move in the future. I view my main role as helping implement this strategy by advancing three areas: Diversity/Equity/Inclusion; Research; and Instruction and Workforce Development. We are implementing several actions associated with each of these areas. Achieving measurable results in each is a high priority. A few examples include:

- We are aggressively hiring excellent staff and faculty providing them with needed facilities.
- We are working to enhance bridge programs at both undergraduate and graduate levels.
- We are striving to increase outreach to high schools and partner colleges across the state to increase pathways for incoming students.
- We are working to provide enhanced mentoring and support to undergraduate and graduate students to enhance their chances of success.

It has been great to meet the CBME faculty. We are already collaborating on grants and grant submissions. I'm excited about continuing those collaborations and building new ones. I want to work from the Dean's Office to support CBME in growing and strengthening its research and instructional priorities.

Dr. John Klier
COE Dean

CBME Student Achievements

Graduate Students Crowned National Champions in PetroBowl
Congratulations to engineering students Ana Carolina Roncoli Jerdy and Elton Lima Correia on representing the University of Oklahoma and winning the National Champion PetroBowl. More information.

Undergraduate Awarded Goldwater Scholarship
Aanahita Ervin, a junior majoring in chemical engineering, has been named a

2021 Goldwater Scholar in a prestigious national competition that recognizes outstanding achievements in science and mathematics. Her selection brings OU's total number of Goldwater Scholarship winners to 59 since the inception of the scholarship in 1986. Learn more.

Former CP Mentor and Current CP Mentor Featured on YouTube
Engineering students Taylor Hampshire and Lucas Condes share insights into the Chevron Phillips Scholar Mentor Program. Interview here.

Taylor Hampshire Awarded Chevron Phillips Outstanding Mentor Award
For the spring 2021 semester, engineering student Taylor Hampshire was honored as the Outstanding Chevron Phillips Mentor. Presentation here.

In His Own Words: Dr. Roger G. Harrison, Jr.

An accomplished engineering professor at the University of Oklahoma has established an endowed fellowship to help graduate students further their studies in CBME.

The Roger G. Harrison, Jr., Graduate Fellowship will support doctoral students. The $200,000 endowed fellowship will help fund advanced study in research areas such as biopharmaceuticals, nanostructure materials or sustainable energy. Learn more.

Here is the background of Roger Harrison, Ph.D., in his own words:

"I majored in chemical engineering at OU and obtained my Bachelor of Science in 1967. In my senior year at OU, I did a research project under the direction of Dr. Phil Colver in the area of heat transfer. Also, during my senior year at OU, I heard lectures given by two famous chemical engineering professors at the University of Wisconsin-Madison, Bob Bird and Ed Lightfoot, who authored the landmark textbook Transport Phenomena. This heavily influenced my decision to attend graduate school there.

After obtaining my Master of Science at the University of Wisconsin-Madison in 1968, I worked two years for Chevon Research in California, first in process design in Richmond and then in process engineering in El Segundo. After that, I returned to graduate school at UW-Madison and completed a doctorate in chemical engineering in 1975 under the direction of Professor Tom Massaro on a study of the hydrodynamics of flow across the artery wall. After my Ph.D., I worked at Upjohn Co. in Kalamazoo, Michigan, in research and development on the separation and purification of antibiotics produced by fermentation. In 1981, I moved to Phillips Petroleum Co. Research Center in Bartlesville, Oklahoma, and worked mainly on the separation and purification of biotechnology products.

I joined the faculty of chemical engineering at OU in 1988. At OU, the general area of my research has been the application of biotechnology to solve medical problems. Toward this end, my research group has developed significant expertise in the engineering, expression, and purification of recombinant proteins produced in Escherichia coli bacteria. We developed the NusA fusion protein system for expressing recombinant proteins in soluble form, which has been licensed by the University of Oklahoma to a biotechnology company for the worldwide research market. The primary emphasis of current research has been on the development of targeted therapies using several approaches, mainly for treating cancer but also for infectious diseases.

I am first author of the textbook Bioseparations Science and Engineering with three coauthors published in 2003 (first edition). and 2015 (second edition)., which has been adopted for use to data in over 70 universities throughout the world.

My family has deep roots in Oklahoma. My grandfather, Arthur Cecil Harrison, came to Oklahoma in 1892 in a covered wagon with his father, mother, and sister from Wise County, Texas, and settled in Tecumseh, Oklahoma; two years later, they moved to Shawnee.

A great-grandfather, Andrew Jackson Hartenbower, rode a horse in the Oklahoma Land Rush of 1889 and staked a claim on land near Orlando. He and his wife, Katie Ann (originally Katy Ann McCarthy, born in Ireland)., later moved to Stillwater, and he served in the Oklahoma House of Representatives starting in 1915.

Both my parents are graduates of OU: Roger Sr. in business administration and Mary Katherine in physical education/dance. I am a graduate of Altus (Oklahoma) High School, where I was on the golf team. I was married to Kathy for 46 years until she passed away in 2020 after a long struggle with Parkinson's disease. I have two sons, Mike and Zack.

The reason I give to chemical engineering at OU is that I want CBME to attract the best graduate students to our program. Ever since I arrived at OU, in faculty meetings we have talked often about the desirability of having endowed funding for our graduate students. My donation is a step toward making this a reality. Also, several years ago my wife Kathy and I decided to set up endowments like this one so we could see the benefits of our donations in our lifetime. We have set up an endowment for undergraduates at Cornell College in Iowa, where Kathy attended for a Bachelor of Arts in English."

Give to CBME

CBME Recent Publications

Bui N.T., Kang H.M., Teat S.J., Su G.M., Pao C.W., Liu Y.S., Zaia E., Guo J., Chen J.L., Meihaus K.R., Mattox T.M., Long J.R., Fiske P., Kostecki R., Urban J.J. (2020). A Nature-Inspired Hydrogen-Bonded Supramolecular Complex for Selective Copper Ion Removal from Water, *Nature Communications*, 11, Art. 3947.

Barrett, L., Seyni, F. I., Kormarneni, M. R., Zapata-Hincapie, J. A., Glatzhofer, D. T., Grady, B., Crossley, S. (2021). Anisotropically Functionalized Nanotube Anchors for Improving the Mechanical Strength of Immiscible Polymer Composites, *ACS Applied Nano Materials*, 4, 580-589.

Chen, K., Horstmeier, S., Nguyen, V. T., Wang, B., Crossley, S., Tram Pham, Gan, Z., Hung, I. White, J. L. (2020). Structure and Catalytic Characterization of a Second Framework Al(IV)Site in Zeolite Catalysts Revealed by NMR . *Journal of the American Chemical Society*, 142, 7514-7523

Galizia, M., Paul, D. R., Freeman, B. D. (2020). Co-ion specific effect on sodium halides sorption and transport in a cross-linked poly(p-styrene sulfonate-co-divinylbenzene). for membrane applications. *Journal of Membrane Science*, 612, Art. 118410.

Loianno, V., Bye, K. P., Galizia, M., Musto, P. (2020). Plasticization mechanism in polybenzimidazole membranes for organic solvent nanofiltration: insights from FTIR spectroscopy. *Journal of Polymer Science*, 58, 2547- 2560

Bye, K. P., Galizia, M. (2020). Molecular origin of flux non-linearity in Organic Solvent Nanofiltration. 1. Formulation of a thermodynamic/transport framework. *Journal of Membrane Science*, 603, Art. 118020

Galizia, M., Freeman, B. D. (2020). Don Paul: 60 years in research and education. *Industrial & Engineering Chemistry Research*, 59, 5203-5204.

Moon, J. D., Galizia, M., Borjigin, H., Liu, R., Riffle, J. S., Freeman, B. D., Paul, D. R. (2020). Modeling water diffusion in polybenzimidazole membranes using partial immobilization and free volume theory. *Polymer*, 189, Art. 122170.

Hamon, J. J., Tabor, R. F., Striolo, A., Grady, B. (2020). "Directly probing surfactant adsorption on nanoscopic trenches and pillars." *Journal of Colloid and Interface Science*, 579, 128-139.

McKernan, P., Cassidy, B., Woodward, A., Battiste, J., Drevets, D., Harrison, R. G. (2020). Phosphatidylserine Expression as a Molecular Target in Listeria monocytogenes and Escherichia coli. *International Journal of Antimicrobial Agents*, 56, Art. 106183.

Harwell, J., Sabatini, D. A., Phaodee, P. (2020). Correlation Between Detergency of Different Oily and Solid Non-Particulate Soils and Hydrophilic-Lipophilic Deviation (HLD). *J. Surfactants Detergents*, 23, 953-962.

Nollert, M., Arrizabalaga, J. (2020). Riboflavin-UVA Crosslinking of Amniotic Membranes and its Influence on the Culture of Adipose-Derived Stem Cells. *Journal of the Mechanical Behavior of Biomedical Materials*, 106, Art. 103729.

Dugan, C. R., Sumter, C. R., Rani, S., Ali, S. A., O'Rear, E. A., Zaman, M. (2020). Rheology of Virgin Asphalt Binder Combined with High Percentages of RAP Binder Rejuvenated with Waste Vegetable Oil. *ACS Omega*, 5, 15791-15798.

Garner, S., O'Rear, E. A., Khajotia, S., Esteban Florez, F. (2020). The Applicability of a Drop Penetration Method to Measure Contact Angles on TiO2 and ZnO Nanoparticles. *Nanomaterials*, 10, Art. 1099.

Wang Y., Leng S., Huang J., Shu M., and D.V. Papavassiliou, (2020). “Modeling of cancer photothermal therapy using near-infrared radiation and functionalized graphene nanosheets,” *International Journal for Numerical Methods in Biomedical Engineering*, 36, Art. e3725.

Nguyen, Q., and D.V. Papavassiliou, (2020). “Using helicity to investigate scalar transport in wall turbulence,” *Physical Review Fluids*, 5, Art. 062605m.

Nguyen, V. and D.V. Papavassiliou, (2020). “Hydrodynamic Dispersion in Porous Media and the Significance of Lagrangian Time and Space Scales,” *Fluids*, 5, Art. 79, Invited paper in Special Issue “Feature Papers in Fluids.”

Gong, F., Li, H., Zhou, Q., Wang, M., Wang, W., Lv, Y., Xiao, R., and D.V. Papavassiliou, (2020). “Agricultural Waste- derived Moisture-absorber for All-weather Atmospheric Water Collection and Electricity Generation,” *Nano Energy*, 74, Art. 104922.

Gong, F., Wang, W., Li, H., Xia, D., Dai, Q., Wub, X., Wang, M., Li, J., Papavassiliou, D.V., and R. Xiao, (2020). “Solid waste and graphite derived solar steam generator for highly-efficient and cost-effective water purification,” *Applied Energy*, 261, Art. 114410.

Razavi, S., Hernandez, L. M., Reed, A., Vargas, W. L., Kretzschmar, I. (2020). Surface tension anomaly observed for chemically-modified Janus particles at the air/water interface. *Journal of Colloid and Interface Science*, 558, 95-99.

Rashidi, A., Razavi, S., Wirth, C. (2020). Influence of cap weight on the motion of a Janus particle very near a wall. *Physical Review E*, 101, Art. 042606.

Teles C, Rabelo-Neto R, Duong N, Quiroz J, Camargo P, Jacobs G, Resasco DE, Noronha F (2020). Role of the metal-support interface in the hydrodeoxygenation reaction of phenol. *Applied Catalysis B: Environmental*, 277, Art. 119238.

Li G, Wang B, Resasco DE (2020). Oxide-catalyzed self-and cross-condensation of cycloketones. Kinetically relevant steps that determine product distribution. *Journal of Catalysis*, 391, 163-174.

Li G, Ngo DT, Yan Y, Tan Q, Wang B, Resasco DE (2020). Factors Determining Selectivity of Acid-and Base-Catalyzed Self-and Cross-Condensation of Acetone and Cyclopentanone. *ACS Catalysis*, 10, 12790-12800.

Makmeesub N, Ritvirulh C, Choojun K, Chen TH, Poo-arporn Y, Resasco DE, Sooknoi T (2020.) Reversible Hydrogenation–Dehydrogenation of Acetylpyridine-Pd-MIL-101 (Cr). for Chemical Hydrogen Storage. *Industrial & Engineering Chemistry Research*, 59, 17671-17679.

Li G. , Dissanayake S, Suib SL, Resasco DE (2020). Activity and stability of mesoporous CeO2 and ZrO2 catalysts for the self-condensation of cyclopentanone. *Applied Catalysis B: Environmental*, 267, Art. 118373.

Santhanaraj D, Ruiz M, Komarneni M, Pham T, Li G, Resasco DE, Faria J (2020). Synthesis of α, β-and β-Unsaturated Acids and Hydroxy Acids by Tandem Oxidation, Epoxidation, and Hydrolysis/Hydrogenation of Bioethanol Derivatives. *Angewandte Chemie* 132, 7526-7530.

Bababrik R, Santhanaraj D, Resasco DE , Wang B (2020). A comparative study of thermal-and electrocatalytic conversion of furfural: methylfuran as a primary and major product. *Journal of Applied Electrochemistry*, 51, 19-26.

Li G, Wang B, Resasco DE (2020). Water Promotion (or Inhibition). of Condensation Reactions Depends on Exposed Cerium Oxide Catalyst Facets. *ACS Catalysis*, 10, 5373-5382.

Anaya F, Resasco DE (2020). Enhanced Fischer–Tropsch Synthesis Rates by the Combined Presence of Aqueous and Organic Media in Biphasic Systems. *ACS Catalysis*, 10, 4433-4443.

Wiley-VCH Verlag GmbH & Co. KGaA (Book Editors: M.Crocker, E.Santillan-Jimenez). Bui TV, Duong N, Anaya F, Ngo D, Warakunwit G, Resasco DE (2020). Chemistry of C-C Bond Formation Reactions Used in Biomass Upgrading: Reaction Mechanisms, Site Requirements, and Catalytic Materials. *Chemical Catalysts for Biomass Upgrading*, 207-297.

Sikavitsas, V., Felder, M. (2020). Effects of Flow Rate on Mesenchymal Stem Cell Oxygen Consumption Rates in 3D Bone-Tissue-Engineered Constructs Cultured in Perfusion Bioreactor Systems. *Fluids*, 5, Art. 30.

Sikavitsas, V. (2020). Introduction to Editorial Board Member: Professor Antonios (Tony). G. Mikos. *Bioengineering and Translational Medicine*, 5, 1-3.

Theurer, J., Ajagbe, O., Osorio, J., Elgaddafi, R., Ahmed, R. M., Walters, K. B., Abbott, B. (2020). Removal of Residual Oil from Produced Water Using Magnetic Nanoparticles. *SPE Journal*, 25, 2482-2495.

Mohan, V., Varadarajan , A., Naske, C., Walters, K. B. (2020). FTIR Spectroscopic Study on the Hydroxide-catalyzed Cleavage of Ester Bonds in Phosphatidylcholine. *Vibrational Spectroscopy*, 109, Art. 103055.

Curnutt, A., Smith, K., Darrow, E., Walters, K. B. (2020). Chemical and Microstructural Characterization of pH and (Ca2+] Dependent Sol-Gel Transitions in Mucin Biopolymer. *Scientific Reports*, 10, 8760.

Wynne, A., Firsch, J., Britten, C., Walters, K. B. (2020). Facile Preparation of Light Emitting Polymer Films Via Surface Modification of Poly(ethylene-co-acrylic acid). Films. *Reactive and Functional Polymers*, 152, Art. 104598.

de Freitas, Isabel C., Parreira, L. S., Barbosa, Eduardo C. M., Novaes, B. A., Mou, T., Alves, T. V., Quiroz, J., Wang, Y.-C., Slater, T. J., Thomas, A., Wang, B., Haigh, S. J., Camargo, Pedro H.C. (2020). Design-controlled synthesis of IrO2 sub-monolayers on Au nanoflowers: marrying plasmonic and electrocatalytic properties. *Nanoscale*, 12, 12281-12291.

Li, G., Ngo, D. T., Yan, Y., Tan, Q., Wang, B., Resasco, D. (2020). Factors Determining Selectivity of Acid- and Base-Catalyzed Self- and Cross-Condensation of Acetone and Cyclopentanone. *ACS Catalysis*, 10, 12790-12800.

Su, J., Mou, T., Wen, J., Wang, B. (2020). First-Principles Study on the Structure, Electronic, and Optical Properties of Cs2AgBiBr6-xClx Mixed-Halide Double Perovskites. *Journal of Physical Chemistry*, 124, 5371-5377.

Li, G., Wang, B., Resasco, D. (2020). Oxide-catalyzed self- and cross-condensation of cycloketones. Kinetically relevant steps that determine product distribution. *Journal of Catalysis,* 391, 163-174.

Resasco, J., Yang, F., Mou, T., Wang, B., Christopher, P., Resasco, D. (2020). Relationship between Atomic Scale Structure and Reactivity of Pt Catalysts: Hydrodeoxygenation of m-Cresol over Isolated Pt Cations and Clusters. *ACS Catalysis*, 10, 595-603.

Chen, K., Horstmeier, S., Nguyen, V. T., Wang, B., Crossley, S., Tram Pham, Gan, Z., Hung, I., White, J. L. (2020). Structure and Catalytic Characterization of a Second Framework Al(IV). Site in Zeolite Catalysts Revealed by NMR at 35.2 T. *Journal of the American Chemical Society*, 142, 7514-7523.

Luo, Z., Nie, R., Nguyen, V. T., Biswas, A., Behera, R. K., Wu, X., Kobayashi, T., Sadow, A., Wang, B., Huang, W., Qi, L. (2020). Transition metal-like carbocatalyst. *Nature Communications*, 11, 1-9.

Li, G., Wang, B., Resasco, D. (2020). Water Promotion (or Inhibition). of Condensation Reactions Depends on Exposed Cerium Oxide Catalyst Facets. *ACS Catalysis*, 10, 5373-5382.

Yang, J., Pei, Z., Deng, J., Mao, Y., Wu, Q., Yang, Z., Wang, B., Aikens, C., Liang, W., Shao, Y.(2020). Analysis and visualization of energy densities. I. Insights from real-time time-dependent density functional theory simulations. *Physical Chemistry Chemical Physics*, 22, 26838-26851.

Pei, Z., Yang, J., Deng, J., Mao, Y., Wu, Q., Yang, Z., Wang, B., Aikens, C., Liang, W., Shao, Y.(2020). Analysis and visualization of energy densities. II. Insights from linear-response time-dependent density functional theory calculations. *Physical Chemistry Chemical Physics*, 22, 26852-28864.

School of Chemical, Biological and Materials Engineering | (405) 325-3721
cbme@ou.edu | www.ou.edu/cbme