



Mark Your Calendars for the PTC Fall meetings!

Scratch Behavior of Polymers Consortium-SCRATCH

Wednesday, October 9th, 2019
Noon—5pm
After the TPO Conference-Troy, MI

Polymer Technology Industrial Consortium-PTIC

October 17th-18th, 2019
College Station, TX
Texas A&M University

UPCOMING EVENTS



Inside the Newsletter

Page 2

PTC Faculty Research
Highlights

Page 3

Research & PTC News

Page 4

PTC News &
SPE Student Chapter

A Material Legacy: Scholarship Supports Materials Students

Abraham Clearfield
Distinguished Professor
Chemistry Department

Tucked away in a quiet corner on the second floor of the Chemistry Building at Texas A&M University, Dr. Abraham Clearfield's office is blanketed with research papers old and new. Personal items naturally mingle with beakers, scientific posters, and the trove of professional accolades that line the walls.



Dr. Abraham Clearfield in his office in the Chemistry Building at Texas A&M. | Image: Dharmesh Patel

The Distinguished Professor retired in spring 2019 from the Department of Chemistry after 43 years of service to the university.

"I told them that you're making a big mistake if you don't have a materials science program at Texas A&M because it's the future. And apparently, some people heard that and they were willing to start in a small way."

Dr. Abraham Clearfield

"It was the seed that Professor Clearfield planted at that time and his continuous support that took us where we are today."

Dr. Ibrahim Karaman, Head of the Department of Materials Science and Engineering

In spring 2018, the Professor Abraham Clearfield Materials Science Scholarship was established, which honors Clearfield for his role in starting materials science and engineering education and research efforts at Texas A&M. The scholarship supports outstanding undergraduate and graduate students pursuing a doctoral degree in the Department of Materials Science and Engineering.

"Something that is real and going to do something for the people in the program is what I was after," said Clearfield, "and I hope to see students that come out of materials science do some great things. This is my contribution to Texas A&M."

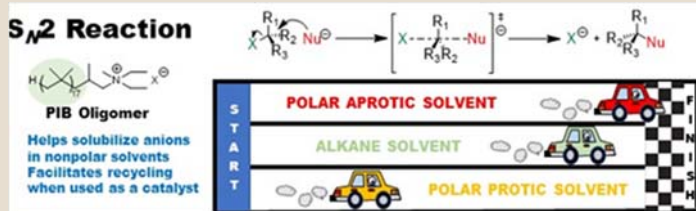
Full story: <https://engineering.tamu.edu/news/2019/08/A-material-legacy-clearfield-scholarship-supports-materials-students.html>



Recyclable Polymeric Systems for Catalysis, as Solvents, and for Sequestration

David Bergbreiter
Regents Professor of Chemistry

The Bergbreiter group's current projects address Green Chemistry problems where recyclable systems use polymers to replace conventional low molecular weight ligands, solvents or other materials in synthesis and water purification. This research stems from earlier work where we used soluble polymers as supports to make recyclable catalysts. That work used terminally functionalized hydrocarbon polymers, particularly polyethylene oligomers or polyisobutylene (PIB) oligomers, to make recyclable catalysts that phase separate from products. The current projects extend this chemistry in several ways. First, we've shown that poly(α -olefin)s (PAOs) can recycle PIB-bound catalysts and that PAOs are fully recyclable and separable from polar solutions of organic products. For example, PAOs can recycle a PIB-bound



phase transfer catalyst and effect SN₂ reactions. Another example uses PIB-bound sulfonic acids in PAO as recyclable catalysts in reactions like esterification and acetal formation. Recent work has also shown that PAOs with modest viscosities are nonvolatile, safer, and recyclable alternatives to alkanes like hexane or heptane in other reactions too. For example, we've shown that reactive organometallics (e.g. *t*-BuLi, Et₂Zn, or R₃B) in PAOs are less flammable and safer to handle than similar reagents in heptane. Recent work shows that PAOs mixed with either conventional or PIB-anchored polar

cosolvents exhibit microheterogeneity. Solvato-chromatic dye spectral changes show that as little as 0.2 M cosolvent makes PAOs quite polar suggesting that recyclable organic polymer solvent systems can be designed to mimic ionic liquids in terms of tunability and recyclability. Third, we've shown that PAOs with added cosolvents are as effective as activated carbon in removing trace organics from water. Compounds like PFOA, BPA, and BTEX can be quantitatively sequestered in minutes. However, unlike activated carbon, PAO systems are media whose chemistry is easily tunable and can be easily regenerated at room temperature.



Questions? – email Bergbreiter at bergbreiter@tamu.edu

Corrosion Control Trends:
Deterministic-Probabilistic Modeling for
Coating/Metallic Substrate
Performance

Homero Castaneda
Associate Professor, Director of National
Corrosion and Materials Reliability Center
Materials Science & Engineering



Dr. Castaneda delivered a plenary Lecture in CORCON 2019 in Bombay, India. This was the biggest conference in Asia related to corrosion. The topic was entitled: "Developments of Deterministic-probabilistic modeling for coating/metallic substrate performance in corrosive/harsh environments." The presentation talked about how protective coatings for harsh/corrosive conditions must retain their integrity and function over prolonged operation. These coatings should also ideally provide a long-lasting lifetime, block aggressive agents, heal imperfections or damage suffered during operation, and unequivocally signal failure when damage is irreparable. We have proposed a rational characterization and quantification concept of damage/performance evolution that incorporates modular elements corresponding to deterministic and probabilistic modelling approach. Distinctive modes of corrosion inhibition, self-healing, and mass transfer blocking based on different properties of the coatings. The presentation included a versatile library of multifunctional coatings that each bring about a distinctive mode of corrosion control and deploy an experimental-theoretical-computer-driven approach rapidly leading to the performance of the systems in different corrosive-harsh environments. The effort seeks to combine distinctive aspects of coating design with deterministic and probabilistic damage/performance modelling in extreme environments and predict operational lifetime for the design coatings/substrate system.





Named Society for Composites Fellow
John Whitcomb
Professor
Department of Aerospace Engineering

Dr. John Whitcomb, professor in the Department of Aerospace Engineering at Texas A&M University, has been promoted by the American Society for Composites (ASC) to Fellow. A fellow is a distinguished member who has made genuinely outstanding contributions to the composites community through research, practice, education, and service.

Full story: <https://engineering.tamu.edu/news/2019/07/whitcomb-named-american-society-for-composites-fellow.html>



MONEY Magazine Names
Texas A&M University
The Best Value in Texas

Texas A&M University is ranked the top university in Texas in MONEY magazine's new best value ranking.

"At a time when a college education is difficult to afford for many families, we take great pride in this acknowledgment of our efforts to offer an outstanding education at an affordable price," said Texas A&M University President Michael K. Young. "We will always endeavor to provide our students a world-class education while keeping costs as low as possible. Our support, through a variety of financial aid and scholarships options, ensures that we are able to keep this commitment. We are committed to providing exceptional higher education opportunities to all who seek it and are so proud to be leading the state in this critical area."

Full story: <https://today.tamu.edu/2019/08/12/money-magazine-names-texas-am-the-best-value-in-texas/>

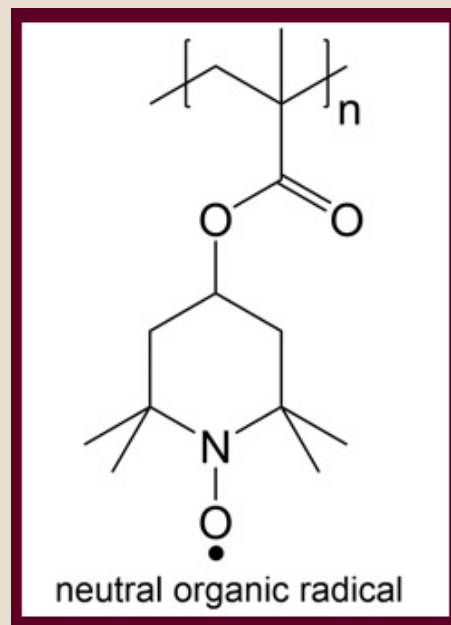


The Energy Implications of Organic
Radical Polymers
Jodie Lutkenhaus
Associate Professor
Department of Chemical Engineering

Dr. Jodie L. Lutkenhaus, associate professor, holder of the William and Ruth Neely Faculty Fellowship and recently named Presidential Impact Fellow in the Artie McFerrin Department of Chemical Engineering at Texas A&M University, published a paper in *Nature Materials*. The findings presented in this paper represent a significant step toward Dr. Lutkenhaus's ultimate goal: the creation of a battery made entirely of polymers.

A major hurdle to creating a metal-free, 100-percent polymer battery is finding a polymer that is electrochemically active -- meaning it has to be able to store and exchange electrons. Dr. Lutkenhaus, along with a team of researchers including doctoral candidate Shaoyang Wang, think that organic radical polymers will do the trick. Owing to their chemical structure, organic radical polymers are very stable and reactive. As shown in the image below, organic radical polymers have a single electron on the radical group. This unpaired electron allows rapid charge transfer in these polymers during redox reactions.

Full story: <https://engineering.tamu.edu/news/2018/11/the-energy-implications-of-organic-radical-polymers.html>



PTC Faculty Members

Name	E-mail Address	Office #
Mustafa Akbulut, CHEN	makbulut@tamu.edu	979-847-8766
Amir Asadi, ENTC	amir.asadi@tamu.edu	979-458-7841
Perla Balbuena, CHEN	balbuena@tamu.edu	979-845-3375
Dave Bergbreiter, CHEM	bergbreiter@tamu.edu	979-845-3437
Janet Bluemel, CHEM	bluemel@tamu.edu	979-845-7749
Iman Borazjani, MEEN	iman@tamu.edu	979-458-5787
Tahir Cagin, MSEN	cagin@tamu.edu	979-862-1449
Homero Castaneda, MSEN	hcastaneda@tamu.edu	979-458-9844
Elena Castell-Perez, BAEN	ecastell@tamu.edu	979-862-7645
Zheng D. Cheng, CHEN	zcheng@tamu.edu	979-845-3413
Abraham Clearfield, CHEM	a-clearfield@tamu.edu	979-845-2936
Terry Creasy, MSEN	tcreasy@tamu.edu	979-458-0118
Donald Darensbourg, CHEM	d-darensbourg@tamu.edu	979-845-5417
Yossef Elabd, CHEN	elabd@tamu.edu	979-845-7506
Lei Fang, CHEM	fang@chem.tamu.edu	979-845-3186
Carmen Gomes, BAEN	carmen@tamu.edu	979-862-7645
Micah Green, CHEN	micah.green@tamu.edu	979-862-1588
Melissa A. Grunlan, BMEN	mgrunlan@tamu.edu	979-845-2406
Wayne Hung, ENTC	hung@tamu.edu	979-845-4989
Helen Liang, MEEN	hliang@tamu.edu	979-862-2623
Jodie Lutkenhaus, CHEN	jodie.lutkenhaus@tamu.edu	979-845-3361
Ravikumar Majeti, PHAR	mrvrkumar@tamu.edu	979-436-0721
Anastasia Muliiana, MEEN	amuliana@tamu.edu	979-458-3579
Mohammad Naraghi, AERO	naraghi@aero.tamu.edu	979-862-3323
K.R. Rajagopal, MEEN	krajagopal@tamu.edu	979-862-4552
Hung-Jue Sue, MSEN	hjsue@tamu.edu	979-845-5024
Steve Suh, MEEN	ssuh@tamu.edu	979-845-1417
Svetlana A. Sukhishvili, MSEN	svetlana@tamu.edu	979-458-9840
Jyhwen Wang, ENTC	jwang@tamu.edu	979-845-4903
John Whitcomb, AERO	whit@aero.tamu.edu	979-845-4006
Karen L. Wooley, CHEM	wooley@tamu.edu	979-845-4077

Texas A&M Enters Top 20 In Wall Street Journal College Rankings

Texas A&M University has risen to No. 18 among public universities and No. 78 overall among more than 950 colleges in the 2020 *Wall Street Journal/ Times Higher Education College Rankings*.



Last year, Texas A&M ranked No. 22 among public universities and No. 94 overall. This year's rankings place Texas A&M in the top 10 percent overall among all colleges and universities surveyed.

Full story: https://today.tamu.edu/2019/09/11/texas-am-enters-top-20-in-wall-street-journal-college-rankings/?utm_source=today_newsletter&utm_medium=today_email&utm_campaign=today_09-12-2019



The 2019-2020 SPE student chapter new officers. For information on becoming a member of the SPE student chapter at TAMU, please contact the below officers.

President	Ying-Hua Fu	yinghua95@tamu.edu
VP Science	Yue Song	ysong@tamu.edu
VP Engineering	Ming-Uei Hung	muhung@tamu.edu
Treasurer	Chia-Ying Tsai	tsaicying@tamu.edu
Secretary	Alice Chang	alicechange29@tamu.edu
Activity Coordinator	Suvesh Manoj Lalwani	lalwanisuvesh@tamu.edu
Liaison Officer	Chenxu Wang	Chenxu_wang@tamu.edu
Webmaster/Social Media Coordinator	Kasturi Sarang	Kasturi_0402@tamu.edu

Polymer Specialty Certificate Updates

Students that have applied for the Polymer Specialty Certificate	77
Students that have received the Polymer Specialty Certificate	57

For more information, please visit: <http://ptc.tamu.edu/polymer-specialty-certificate/>

Have Questions?

[Dr. Hung-Jue Sue](mailto:Dr.Hung-Jue.Sue@tamu.edu)

[Isabel Cantu](mailto:Isabel.Cantu@tamu.edu)

PTC Director

E-mail: icantu@tamu.edu

E-mail: hjsue@tamu.edu

Phone: 979-458-0918

4

PTC
POLYMER TECHNOLOGY
MATERIALS SCIENCE & ENGINEERING

PTC newsletter prepared by:
 Isabel Cantu