



Covestro is guided by a simple and powerful purpose: **to make the world a brighter place.** The company focuses on innovation and sustainability to develop premium polymer materials that benefit society and coming generations.

With its materials and application solutions found in nearly every area of modern life, Covestro is among the leading suppliers of high-performance polymers. Covestro develops sustainable solutions to the greatest challenges of our age: climate change, resource depletion, urban expansion, and population growth. These concerns will inevitably lead to a higher demand for renewable energies, alternative resources, energy-efficient transportation, and sustainable, affordable housing.

Covestro aims to meet this demand with long-lasting, light, environmentally friendly and cost-effective materials, which in many cases are suitable replacements for conventional materials such as steel and glass. The main segments served are the automotive, electrical and electronics, construction, medical, sports, and leisure industries.

At the backbone of their organization's success are its 15,600 employees, who work at around 30 sites across the globe – from smaller technical centers and innovation hubs, to large-scale production plants. Covestro's activities are coordinated from its corporate headquarters in Leverkusen, Germany, with sales of more than €11.9 billion in 2016. More at [www.covestro.com](http://www.covestro.com).

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*Professor David A. Tirrell, 2014-2015*  
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*Professor Frank S. Bates, 2012-2013*  
*Dr. Mohan Srinivasarao, 2011-2012*  
*Professor James Heath, 2010-2011*  
*Dr. Catherine Coleman, 2009-2010*  
*Professor Edwin L. Thomas, 2008-2009*

*Professor George Whitesides, 2007-2008*  
*Professor Julia Kornfield, 2006-2007*  
*Professor Jean M.J. Fréchet, 2005-2006*  
*Professor Samuel Stupp, 2004-2005*  
*Dr. Craig J. Hawker, 2003-2004*  
*Dr. Richard Turner, 2002-2003*  
*Dr. Elsa Reichmanis, 2001-2002*  
*Dr. Robert Langer, 2000-2001*  
*Professor Robert H. Grubbs, 1999-2000*  
*Professor Herbert Morawetz, 1998-1999*

Richard Stein—Covestro

in Polymer Chemistry

# Annimas Karapourou

The Department of Chemistry, University of Massachusetts Amherst  
presents

**PROFESSOR KAREN L. WOOLEY**

Texas A & M University, Departments of Chemistry,  
Chemical Engineering, and Materials Science & Engineering

*“Expanding the Scopes of Synthetic Organic and Polymer  
Chemistries: Utilization of the inherent stereochemical and  
functional diversities of natural products to produce unique materials”*

Thursday, November 30, 2017

11:30 a.m., 1634 LGRT

Refreshments at 11:00 a.m.

## Karen Wooley

**K**AREN L. WOOLEY is the W. T. Doherty-Welch Chair in Chemistry, University Distinguished Professor and recently named Presidential Impact Fellow - a Lifetime Entitlement at Texas A&M University, where she holds appointments in the Departments of Chemistry, Chemical Engineering and Materials Science & Engineering. She also serves as Director of the Laboratory for Synthetic-Biologic Interactions. Research interests include the synthesis and characterization of degradable polymers derived from natural products, unique macromolecular architectures and complex polymer assemblies, and the design and development of well-defined nanostructured materials. The development of novel synthetic strategies, fundamental study of physicochemical and mechanical properties, and investigation of the functional performance of her materials in the diagnosis and treatment of disease, as non-toxic anti-biofouling or anti-icing coatings, as materials for microelectronics device applications, and as environmental remediation systems are particular foci of her research activities. Her academic training included undergraduate study at Oregon State University (B.S., 1988) and graduate study under the direction of Professor Jean M. J. Fréchet at Cornell University (Ph.D., 1993). She began an academic career as an Assistant Professor of Chemistry at Washington University in St. Louis, Missouri, was promoted in 1999 to Full Professor with tenure, was installed in 2006 as a James S. McDonnell Distinguished University Professor in Arts & Sciences, in 2007 received an appointment in the School of Medicine, Department of Radiology and in July 2009, Karen relocated to Texas A&M University. Recent awards include the American Chemical Society Award in Polymer Chemistry (2014), Royal Society of Chemistry Centenary Prize (2014), Fellow of the Royal Society of Chemistry (2014), Honorary Fellow of the Chinese Chemical Society (2014), Oesper Award (2015), Fellow of the American Academy of Arts and Sciences (2015), and both Distinguished Research and Teaching Achievement Awards from the Texas A&M University Association of Former Students (2016). Karen currently serves as an Associate Editor for the Journal of the American Chemical Society, among many other advisory roles within the broader scientific community.



**ABSTRACT** A primary interest in the Wooley laboratory is the production of functional polymers from renewable sources that are capable of reverting to those natural products once their purpose has been served. The inherent stereochemical and functional diversities of natural products provide opportunities to expand the scopes and complexities of polymer materials, by utilizing fundamental synthetic organic chemistry approaches. This presentation will highlight synthetic strategies for the development of polymers, block polymers and crosslinked network materials, which can be produced by relatively simple approaches from complex polyhydroxyl natural products and can be made to exhibit a range of properties. It is expected that the physical, mechanical, supramolecular assembly and stability properties will be tuned by the chemical compositions and structures, controlled by the advancement of synthetic methodologies by which to prepare such materials. Polycarbonates and polyphosphoesters that can be produced rapidly as well-defined block polymers and then undergo multiple chemical transformations and direct assembly in water into functional nanomaterials are serving as platforms for several directions toward their development as biomedical devices for the treatment of lung infections and osteosarcoma lung metastases. If time allows, recent developments toward the preparation of functional polypeptides and their assemblies will also be described.

**R**ICHARD STEIN was born in Far Rockaway, New York in 1925. He was an undergraduate at Brooklyn Polytechnic, where he made some of the first light scattering studies of the dimensions of polymers in solution. He received his Ph.D. from Princeton for work with Professor Tobolsky on using birefringence and X-ray diffraction to study polymer orientational relaxation. He then spent a postdoctoral year at Cambridge University to extend his studies using infrared dichroism. Stein joined the University of Massachusetts Chemistry faculty in 1950, where he began his pioneering studies into the development of rheo-optical techniques for studying orientation and phase transition phenomena in amorphous, crystalline and liquid crystalline polymers. Stein initiated the Polymer Science and Engineering Department and now serves as Emeritus Goessmann Professor in Chemistry. He has over 400 publications, and has been consulting for companies such as Monsanto and Bayer for over 45 years.

Dr. Stein's efforts have been recognized by awards from the American Chemical Society, the American Physical Society, the Society of Rheology, the Society of Plastics Engineers, the Society of Polymer Science in Japan, and the Plastics Hall of Fame. In 1999, the Materials Research Society conferred on him its highest honor, the Von Hippel Award. He received a Distinguished Alumni Award from Polytechnic University in Brooklyn, and has been awarded three honorary doctorates. Dr. Stein was named to the National Science and National Engineering Academies, as well as the American Academy of Arts and Sciences. He was a member of the first delegation in Chemistry to the People's Republic of China.

Professor Stein is still actively involved in research. He was a founder of the Pioneer Valley Biochar Initiative, a member of the Planning Committee for the North American Biochar Symposium in 2013, and co-organizer of the UMass contribution to the National Teach-In for Global Warming Solutions, and of the New England Biochar Symposium, in 2009. He gives public lectures on the topic, and in 2011, he co-authored a book titled "The Energy Problem." In June of 2014, Prof. Stein was presented with a certificate

of Congressional Recognition for his outstanding service to UMass and to the community. In August of 2015, Senator Rosenberg presented Prof. Stein with an official Joint House Senate resolution recognizing his many accomplishments and contributions to the Commonwealth.



Richard Stein