

About Bayer

Bayer is a global company with over 95,000 employees worldwide, and is organized as three operating companies-Bayer HealthCare, Bayer CropScience, and Bayer MaterialScience. An important goal of the company is to improve people's lives through a broad range of essential products that help diagnose and treat diseases, protect crops and produce high quality materials for a variety of applications.

Bayer MaterialScience is one of the leading producers of polymers and high-performance plastics with 18,000 employees at 40 sites around the world and 2005 sales of 10.7 billion euros. The company's innovative developments in coating, adhesive and sealant raw materials, polycarbonates, polyurethanes and thermoplastic urethane elastomers enhance the design and functionality of products in a wide variety of markets, including the automotive, construction, electrical and electronics, household and medical industries, and the sports and leisure fields. In addition, the basic inorganic chemicals unit produces chlorine and related essential products for the chemicals industry.

THE UNIVERSITY OF AKRON DEPARTMENT OF POLYMER ENGINEERING



PRESENTS

BAYER LECTURESHIP

Dr. Robert E. Cohen

*St. Laurent Professor of Chemical Engineering,
Massachusetts Institute of Technology*

LECTURE 1

Thursday, September 22, 2011

2:00 p.m.

**"Exploitation of Layer-by-Layer Assembly in
Bio-Inspired Materials Engineering"**

LECTURE 2

Friday, September 23, 2011

2:00 p.m.

"Designing Robust Omniphobic Surfaces"

SPONSORED BY BAYER MATERIAL SCIENCE, PITTSBURGH

BAYER LECTURESHIP IN POLYMER ENGINEERING



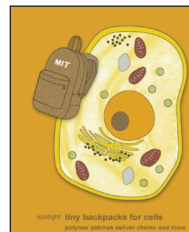
Robert E. Cohen was born and raised in Oil City, Pennsylvania, an environment that led to an early interest in the discipline of Chemical Engineering. He studied at Cornell (BS), Caltech (MS and PhD) and Oxford University (Postdoc) prior to joining the MIT faculty in 1973. He is the founding Director of MIT's Program in Polymer Science and Technology and the architect of MIT's unique Doctoral Program in Chemical Engineering Practice. Currently he is the St. Laurent Professor of Chemical Engineering. He has directed the DuPont/MIT Alliance since its inception in 2000. His publications reflect interests in polymer structure/property relations. Based on patents produced in his laboratory, he co-founded MatTek Corporation (<http://www.mattek.com>) in 1985. He is a fellow of the American Institute of Chemical Engineers, the American Physical Society and the Materials Research Society. In 2010 he was elected to the National Academy of Engineering. Bob and his wife Jane live in the Jamaica Plain section of the city of Boston. They have two children: Genevieve, a kindergarten teacher in San Diego CA, and Eliot who works in information technology in Boston.

THURSDAY, SEPTEMBER 22, 2011

"Exploitation of Layer-by-Layer Assembly in Bio-Inspired Materials Engineering"

A decade-long collaboration with colleague Professor Michael F. Rubner of the Department of Materials Science and Engineering at MIT has focused on novel and useful surface/thin-film phenomena that are observed in nature. We have employed a simple and elegant water-based layer-by-layer assembly technique to provide conformal multifunctional coatings on a wide variety of substrates. Proper selection of nanoparticles and macromolecules and precise control of processing conditions have enabled us to develop materials that mimic some fascinating natural phenomena: fog harvesting by desert beetles, broadband antireflection of the moth eye, and the brilliant structural colors found in hummingbird and butterfly wings. We have also brought our methodologies to the

biotic/abiotic interface where we assemble payload-containing 'backpack' structures on living immune cells for possible use in in-vivo imaging, therapies and bottom-up tissue engineering.



FRIDAY, SEPTEMBER 23, 2011

"Designing Robust Omniphobic Surfaces"

Superhydrophobic surfaces that display water contact angles greater than 150° with low contact angle hysteresis are becoming commonplace in the materials community. Microscopic pockets of air trapped beneath the high surface tension ($\gamma_{lv} = 72\text{mN/m}$) water droplets lead to a composite solid-liquid-air interface in thermodynamic equilibrium. Previous experimental and theoretical work suggests that it should not be possible to form similar fully-equilibrated composite interfaces with drops of low surface tension liquids such as alcohols or alkanes (e.g. pentane: $\gamma_{lv} = 16\text{mN/m}$). In this lecture I will discuss novel surfaces that possess the required combination of re-entrant topographical texture and surface chemistry to support strongly metastable composite solid-liquid-air interfaces for any liquid. Quantitative design parameters will be introduced to guide the development of these novel omniphobic surfaces. For a given feature size R , two independent design parameters [surface chemistry as revealed in the equilibrium contact angle θ , and texture spacing, embodied in the dimensionless spacing ratio $D^* = (R+D)/R$] can be used to develop surfaces with desirably large values of apparent contact angle (θ^*) and robustness of the metastable composite interface. Most revealing is the scaling of the composite interface robustness which indicates clearly why, in the consideration of self-similar arrangements of topographical surface features, 'smaller is better' for producing surfaces that resist wetting by low energy liquids. Examples that have been realized to date include lithographically fabricated features in silicon, randomly deposited fiber mats, dip-coated textiles and wire meshes.

