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University at Buffalo School of Engineering and Applied Sciences
is Proud to Announce

The 2016 Eli Ruckenstein Lecture



Self-organization on Nano Scales: Fabrication beyond the Top-down and Bottom-up by Harnessing Thin Film Instabilities

Dr. Ashutosh Sharma

Secretary, Department of Science and
Technology, Government of India

Department of Chemical Engineering,
Indian Institute of Technology, Kanpur

Friday, April 15, 2016
2:30 p.m.

Screening Room first floor,
Center for the Arts
UB Amherst Campus

*Reception to follow
immediately after – Atrium*

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or 716.645.1174*

The School of Engineering and Applied Sciences



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REACHING OTHERS



About Eli Ruckenstein:

Eli Ruckenstein, SUNY Distinguished Professor, joined the faculty of the University at Buffalo in 1973. Ruckenstein spent his formative years behind the Iron Curtain, in Romania, where — with a combination of native intellect, genuine scientific curiosity, and sheer strength of will — he began what would become a professional lifetime of achievement in engineering and science, receiving the George Spacu Award for Research in Surface Phenomena from the Romanian Academy of Science as well as awards from the Romanian Department of Education for teaching, for research in turbulent heat and mass transfer, and for research in distillation.

In 1969, he escaped to the West, where his prolific and imaginative research has advanced almost every area of interest to chemical engineering. He has received the Alpha Chi Sigma Award for his work in transport phenomena, the Walker Award for his work in catalysis, and the Founders Award for his overall contributions to science from the American Institute of Chemical Engineers and the Kendall Award for his research in colloids and interfaces, the Langmuir Lecture Award for his contributions to macromolecules, the Schoellkopf Medal for his work in supported metal catalysts, and the Murphree Award in Industrial and Engineering Chemistry from the American Chemical Society. His work in biomolecules was recognized with the Creativity Award from the National Science Foundation. He has presented two Berkeley Lectures in Chemical Engineering and is a winner of the Chancellor Charles P. Norton Medal from SUNY Buffalo. He is a fellow of the AIChE and the American Nano Society.

Eli Ruckenstein was elected to the U. S. National Academy of Engineering in 1990, and in 2004 he was chosen to receive the Academy's Founders Award. He has also been elected to the American Academy of Arts and Sciences, and he has received the Humboldt Award from Germany for his work in surfactants. The Hauptman-Woodward Medical Research Institute named him one of their inaugural Pioneers of Science awardees. His seminal contributions across such a broad range of disciplines were further recognized when the President of the United States awarded him the National Medal of Science in a White House ceremony in 1999. His impact upon the development of the chemical engineering profession resulted in the American Institute of Chemical Engineers designating him as one of 50 Eminent Chemical Engineers of the Foundation age. Several of Dr. Ruckenstein's papers have been republished in four volumes, two on thermodynamics of multicomponent solutions and nanodispersion by Springer, one on catalysis by Wiley, and the most recent on nucleation by CRC-Press.

The Ruckenstein Lecture Series

is supported by the Ruckenstein Endowment Fund

Previous Lecturers

- 2009 Rakesh K. Jain, Harvard Medical School and Massachusetts General Hospital
- 2010 George Stephanopoulos, Massachusetts Institute of Technology
- 2011 Pablo G. Debenedetti, Princeton University
- 2012 Dennis C. Prieve, Carnegie Mellon University
- 2013 Nicholas A. Peppas, University of Texas at Austin
- 2014 Mark E. Davis, California Institute of Technology
- 2015 Robert E. Langer, Massachusetts Institute of Technology

The UB Department of Chemical and Biological Engineering offers a world-class undergraduate education while pursuing integrative research and graduate training at the frontiers of chemical engineering, in the main areas of nanoscale science and engineering, computational science and engineering, and biochemical and biomedical engineering. The CBE department has undergone tremendous growth in the past few years, and added six new faculty to our ranks, which include three members of the National Academy of Engineering.

Self-organization on Nano Scales: Fabrication beyond the Top-down and Bottom-up by Harnessing Thin Film Instabilities

Dr. Ashutosh Sharma

Secretary, Department of Science and Technology, Government of India
Department of Chemical Engineering, Indian Institute of Technology, Kanpur

Abstract:

Inexpensive, fast and large-area nanofabrication across a variety of materials remains a challenge which impacts important advances in functional interfaces, energy, electronics, health and environment. This talk will summarize some of our recent work on understanding and control of self-organization and instabilities in thin soft films. The focus will be on fabrication of large area nano/micro patterns and structures by harnessing of self-organized instabilities. I will illustrate the basic principles by examples from *Directed Dewetting* of thin (5 nm-100 nm) polymer liquid films, *Elastic Contact Instability* of soft solid films, *Electric Field Modulation of Interfaces*, *Directed Electrospinning* and *Diffraction Patterned Induced Self-organization*. An important point discussed will be a unique strategy to reduce the length scale of physical self-organizational processes from tens of micrometers to sub-100 nm levels that are characteristic of chemical self-assembly. Applications range from textured coatings, multiscale composites, cell-scaffolds, supported catalysis, nanolens and nanowire arrays to a reusable pressure sensitive adhesive with a nano-skin. This talk will be a tribute to the pioneering work initiated by Prof. Ruckenstein and his coworkers on thin films in the 70s and 80s. Dr. Sharma will also share his experience working as Secretary, Dept. of Science and Technology, Government of India.

About Ashutosh Sharma:

1988 UB CBE PhD graduate Dr. Ashutosh Sharma is Secretary, Department of Science and Technology, Government of India. Dr. Sharma credits his time at UB and his mentor, Dr. Eli Ruckenstein in large part for his success post-UB. "I certainly owe UB and Eli a great deal in shaping my story. The strong research ethos there encouraged me to think independently and take multidisciplinary approaches. His advocacy and personal example of hard work, creativity and overall excitement about the research were my inspiration. UB CBE also offered me strong graduate courses and splendid learning opportunities in the form of weekly seminars presented by outstanding researchers." Dr. Sharma was an Institute Chair Professor and Head of the Department of Chemical Engineering at Indian Institute of Technology Kanpur, where he also established a Nanoscience Center. He is best known for his pioneering research work in the areas of colloids, soft thin films, interfaces, adhesion, patterning, and in the fabrication and application of self-assembled nano-structures. His current interests are in nanofabrication and nanomaterials for energy, environment and health. Dr. Sharma is also the UB Alumni Association Distinguished International Alumni Award recipient for 2016.



School of Engineering and Applied Sciences



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