

November 16-17, 2011 /

4:30 PM

W1-3 Building /

1F, Multimedia Hall

Dr. William J. Koros

Professor, Roberto C. Goizueta Chair

for

Excellence in Chemical Engineering,
and

GRA Eminent Scholar in Membranes
School of Chemical & Biomolecular
Engineering

Georgia Institute of Technology

Lecture 1

Membranes and sorbents: large scale separation change agents for a sustainable future

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Although purification and separation processes provide products vital to society, most large scale approaches still rely primarily upon highly energy intensive operations such as distillation. A significant fraction of global energy is consumed to meet separation and purification needs of society. Moreover, movement to alternative sources may actually increase this consumption, since separation needs are more difficult to meet in such cases. Energy intensity and carbon dioxide emissions associated with many large scale separations can be reduced by a full order of magnitude by substituting membrane processes for traditional thermally-driven separation approaches. In addition, advanced sorbent approaches can provide low to moderate energy intensity solutions in cases where membranes are not ideally suited. The combination of advanced membranes and advanced sorbents can allow industrial growth along with protection of the environment and conservation of resources. While understandable in ideal thermodynamic terms, new generations of separation materials and devices are needed to actually implement this vision. This presentation will provide a framework and examples of how it can be applied to introduce these "change agents" to remodel the separations landscape.

Lecture 2

Engineering a revolution in membranes and sorbents: the details are important

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Over recent decades, chemists have identified a fascinating and potentially revolutionary set of materials from which advanced separation devices can be produced. These materials offer the promise to address many of the energy and environmental challenges to enable a sustainable future worldwide economy. Despite the spectacular array of such materials, emergence of a truly new generation of practical devices with broad applications has not occurred. The diversity of separation needs requires the creation of economical devices from a broad spectrum of nanostructured materials ranging from pure inorganics, metals and carbons to pure organic polymers. In addition, hybrid materials containing molecularly selective nanoscopic dispersed phases in a polymer continuous phase are particularly important components in this vision. Identifying and motivating practical approaches to create such revolutionary devices begins with chemical engineers but must also integrate diverse contributions from materials scientists and mechanical engineers with a systems perspective. This presentation will consider paths to reach the next generation of membranes and sorbents to deliver large scale separation processes with much lower energy intensity and smaller carbon footprints.



Dr. William J. Koros

William J. Koros is The GRA Eminent Scholar in Membranes and the Roberto C. Goizueta Chair for Excellence in Chemical Engineering at Georgia Institute of Technology. Professor Koros received his Bachelor's degree in Chemical Engineering from The University of Texas in 1969 and worked in the Engineering Department of the E. I. DuPont Company for the next four years. He entered graduate school in 1973 and upon completion of his studies in 1977 joined the faculty of the Chemical Engineering Department at the North Carolina State University as an Assistant Professor.

While at NCSU, Dr. Koros received the Sigma XI Award for research accomplishments in 1980 and was selected as one of the university's fourteen Outstanding Teachers that same year. He played an active role in committees for teaching effectiveness and academic programs. In 1983, Dr. Koros received the Alcoa Foundation Award for Outstanding Research Accomplishments and was promoted to the rank of Professor in August 1983. In 1984 he moved to The University of Texas at Austin where he served as Chairman of Chemical Engineering from 1993 to 1997.

Dr. Koros joined the School of Chemical Engineering at Georgia Institute of Technology in 2001. He served as the Editor-in-Chief of the Journal of Membrane Science for 17 years from 1991-2008. He has published over 300 articles and holds 14 US Patents in the areas of sorption and transport of small molecules in membranes, barrier materials and sorbents. His research has been recognized by the AIChE Institute Award for Excellence in Industrial Gases Technology in 1995, the AIChE Separation Division Clarence Gerhold Award in 1999 and the AIChE William H. Walker Award for Excellence in Contributions to Chemical Engineering Literature. He was elected to the National Academy of Engineering in 2000, and was named a Fellow of the American Institute of Chemical Engineers in 2002 and a Fellow of the American Association for the Advancement of Science in 2003. In 2008, Dr. Koros received the Alan S. Michaels Award for Innovation in Membrane Science and Technology from the North American Membrane Society. He is one of 12 KAUST Investigators selected worldwide to help launch the King Abdullah University of Science and Technology in Saudi Arabia focused on solving key problems facing mankind. He was the 2011 AIChE Institute Lecturer.



About “The KAIST CBE Global Distinguished Lectureship”

The KAIST CBE Global Distinguished Lectureship in the Department of Chemical and Biomolecular Engineering commences this year. The lectureship is an annual event in which an internationally leading researcher in chemical and biomolecular engineering at a foreign institution will be selected and invited to give a series of lectures. The lectures will be open to our students and faculty as well as alumni and friends. The visiting lecturer, in addition to giving the seminars on recent trends and advances in his / her field, will be asked to participate in informal discussions with KAIST faculty and students. The hope is that the seminar series will grow to become a marquee event and a proud tradition for our department in due time.

The KAIST CBE Global Distinguished Lectureship is initiated with generous gifts from our faculty and alumni. The department is currently looking for a corporate sponsor to make it a fully endowed lectureship.

FOR ADDITIONAL INFORMATION, PLEASE CONTACT:

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