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## Challenges for the Chemical Industry in the 21st Century

**Alan Nelson, The Dow Chemical Company, Midland, Michigan USA**

Director of Research & Development

Patrick F. Taylor Hall 1106
March 21, 2014 - 03:30 pm

**Abstract:**

"The United States is presently, and is expected to remain, among the world's leaders in all subareas of chemical engineering research, with clear leadership in several subareas. U.S. leadership in some classical and emerging subareas will be strongly challenged." [1]

"U.S. leadership in the core areas of transport processes; separations; catalysis; kinetics and reaction engineering; process development and design; and dynamics, control, and operational optimization is now shared with Europe, and in some cases Japan…" [1]

"A strong manufacturing base, culture, and system of innovation, and the excellence and flexibility of the education and research enterprise have been and still are the major determinants of U.S. leadership in chemical engineering." [1]

The U.S. dominance of process and manufacturing technology has been enabled by the history of dedication to chemical engineering education and research. Development and application of core principles – transport processes, reaction engineering, and thermodynamics – have been, in large part, responsible to the growth of the U.S. chemical industry. The continued development of these core competencies and the commensurate education of the next generation of chemical engineers are now being challenged by a shifting global industrial strategy, a narrowing of the field of chemical engineering, and the lack of research funding in core areas. Success of the American manufacturing renaissance will require a re-commitment to chemical engineering education and research to prevent the progressive erosion of the core areas. This will also require deliberate action throughout the entire chemical engineering community; students , educators, government agencies, and industry leaders. During this presentation, we will discuss the manufacturing renaissance, industrial needs for supporting the renaissance, critical to success parameters, and the role that each of us can have to enable long-term, sustainable manufacturing in the U.S.

[1] International Benchmarking of U.S. Chemical Engineering Research Competitiveness , National Research Council, 2007.

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**Speaker's Bio:**

Dr. Alan Nelson serves as Director of Research & Development for Dow's Performance Monomers business, which has the most robust monomer portfolio in the world and is one of the largest producers of acrylics, acrylates, methacrylates, and specialty monomers. Prior to his current role leading R&D for Performance Monomers, Nelson was R&D Director for Dow Energy Materials, launching Dow's lithium ion battery materials business. He was also R&D Director for engineering sciences in corporate research and development, responsible for Dow's global R&D capabilities in process engineering.

He earned his Bachelor of Science degree in Chemical Engineering from UMD in 1997, and then went on to receive his Ph.D. in Chemical Engineering from Michigan Technological University. He also completed the Clean Energy Ventures Program at the MIT Sloan School of Executive Education.

Alan resides in Midland, Michigan with his wife Melissa and their three children (Jack, Josianne, and Sophia).



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