

CHEMICAL AND BIOLOGICAL ENGINEERING DEPARTMENT SEMINAR SERIES

***Phytochemical Engineering – Combining Chemical
Reaction Engineering with Plant Science***

Presented by: Dr. Jacqueline V. Shanks, Professor of Chemical Engineering
Iowa State University

Time: Wednesday, November 28; 3:15 – 4:30 pm

Location: Perlstein Hall Auditorium

Abstract

Imagine a chemical reactor that only uses CO₂, water from any source, and light as reactants and produces chemical and materials for the 6 F's sectors in our economy: food for humans, feed for animals, fiber, fuel, pharmaceuticals, and feedstocks for the chemical industry. Now at the same time visualize that this same chemical reactor can provide O₂ for fresher air and clean-up xenobiotics (man-made organic chemicals) and metals from soil and groundwater while being aesthetically pleasing. Sounds farfetched? Not really. Plants have evolved to have exquisite and more complicated chemistries than any other living organism. Given the exquisite chemistries in plants, and the numerous commercial applications, it is natural for chemical engineers to be involved in exploiting these chemistries. The term "phytocatalysis" is used to denote any reaction(s) in which a substrate is converted to product by a plant enzyme and the engineering concerned with these reactions and reaction networks. "Phytochemical engineering" refers specifically to the production of pharmacologically active natural products synthesized via phytocatalysis. This talk will focus on the opportunities for chemical engineers in studying reaction networks within plants or their cells and tissues and the role that chemical engineers can play in making significant advances in the plant sciences through phytocatalysis and phytochemical engineering.

Biography

Jacqueline V. Shanks is professor in chemical engineering at Iowa State University and an adjunct professor in bioengineering at Rice University. She received her B.S. degree in chemical engineering from Iowa State University in 1983 and her Ph.D. degree in chemical engineering from the California Institute of Technology in 1989. She joined the chemical engineering department at Rice University as an assistant professor in 1988 and became associate professor in 1993. She joined the bioengineering department at Rice in 1997, and was promoted to full professor in bioengineering and chemical engineering in 1999. In Fall 1999, she joined the faculty at Iowa State University. Dr. Shanks' research interests include plant metabolic engineering of secondary metabolites, nuclear magnetic resonance spectroscopy (NMR) techniques for metabolic flux analysis, phytoremediation of explosives and related nitroaromatics, and production of valuable products from biorenewable resources. She received the National Science Foundation Young Investigator Award in 1992, and the Professional Progress in Engineering Award from Iowa State University in 1994, and the ISU University Foundation Award for Outstanding Achievement in Research in 2005. She was elected as Fellow to the American Institute of Medical and Biological Engineers in 2000. She was a member of the National Research Council Committee on Biobased Industrial Products. In the American Chemical Society, Dr. Shanks is a member of the Biochemical Technology (BIOT) and Environmental Chemistry (ENVI) Divisions. In BIOT, she served as Chair, Chair-Elect, and Past-Chair from 2000 - 2002, Alternate Councilor from 1995 - 1997, and Newsletter Editor from 1998 - 2000. She received the Van Lanen Award for service in the BIOT division in 2004. She served as Co-editor for the year 2000 of the Biochemical Engineering section of Current Opinion in Biotechnology, and as Co-editor for a 2002 issue of Metabolic Engineering devoted to Plant Metabolic Engineering. She is a member of the Editorial Advisory Board for Biotechnology Progress.