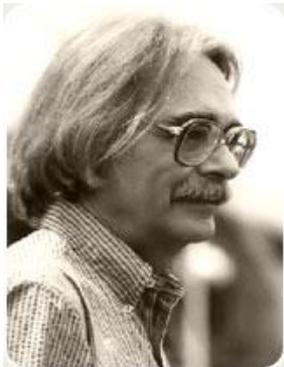


## Michael M. Abbott (1938-2006)



Michael Abbott received his B.S. in Chemical Engineering in 1961, and his Ph.D. in Chemical Engineering in 1965, both from Rensselaer Polytechnic Institute. He worked for four years at Exxon Research and Engineering. He joined Rensselaer as a postdoctoral fellow in 1969, and joined the Chemical Engineering Department as a Professor in 1974, where he worked till 2006.

Prof. Abbott was an internationally recognized expert in chemical thermodynamics. He co-authored four textbooks, including the best-selling chemical engineering text of all time, *Introduction to Chemical Engineering Thermodynamics*, currently in its seventh edition. Abbott had a passion for teaching, and received many awards in recognition of his work as a teacher and mentor, including the Tau Beta Pi Outstanding Engineering Instructor Award (1976), the Trustees' Outstanding Teacher Award, the Western Electric Fund Award from ASEE (1979), the Rensselaer Distinguished Teaching Fellowship (1986-88), and the first Rensselaer Alumni Association Teaching Award in 1994. Beyond academics, Abbott had wide ranging interests including literature, poetry, and music. The Michael M. Abbott Lecture Series hosted each spring in the Chemical Engineering Department honors Abbott's legacy and celebrates his achievements.

### Previous Abbott Lecture Awardees

2006	Jefferson W. Tester, Massachusetts Institute of Technology
2007	Pablo Debenedetti, Princeton University
2008	Michael F. Doherty, University of California-Santa Barbara
2009	Zhen-Gang Wang, California Institute of Technology
2010	George "Bud" Homsey, University of British Columbia
2011	Frank S. Bates, University of Minnesota
2012	K. Dane Wittrup, Massachusetts Institute of Technology
2013	Curtis W. Frank, Stanford University
2014	John F. Brady, California Institute of Technology
2015	Jay Keasling, University of California, Berkeley
2016	Gregory Stephanopoulos, Massachusetts Institute of Technology
2017	Paula Hammond, Massachusetts Institute of Technology



## The Isermann Department of Chemical & Biological Engineering

presents

**Professor Andrew Zydney**

Distinguished Professor

Director of the Center of Excellence in Industrial  
Biotechnology

Department of Chemical Engineering  
Pennsylvania State University

***Michael M. Abbott Lecture Series***

Wednesday, April 18, 2018

Thursday, April 19, 2018

April 18, 2018 – Ricketts 211 @ 9:15 AM  
Coffee & pastries – 8:45 AM – Coonley Lounge

## Andrew Zydney



•Dr. Andrew L. Zydney is currently Distinguished Professor of Chemical Engineering at The Pennsylvania State University, having served as Head of that Department from 2004-2014. Dr. Zydney is also Director of the newly formed *Center of Excellence in Industrial Biotechnology* at Penn State and the Bayard D. Kunkle Chair in Engineering. Professor Zydney received his B.S. in Chemical Engineering from Yale in 1980 and his Ph.D. from M.I.T. in 1985. He was a faculty member in the Chemical Engineering Department at the University of Delaware from 1985 - 2001.

•Professor Zydney's research is focused on bioprocessing and membrane technology, with a particular emphasis on the use of membrane systems for the purification of biotherapeutics and the development of artificial organs. He has published more than 200 articles on these topics, including invited contributions to the [Encyclopedia of Bioprocess Technology](#) and the [Handbook of Biomedical Engineering](#). He is the most recipient of the *Gerhold Award* for Outstanding contributions to Separation Science and Technology given by the AIChE, and he previously received the *Excellence in Biological Engineering Publications Award* from the AIChE. Professor Zydney is the Editor-in-Chief of the *Journal of Membrane Science*, and he serves on the Editorial Boards for *Separation and Purification Reviews*, *Separation Science and Technology*, *Current Opinion in Chemical Engineering*, and *Biotechnology and Bioengineering*. He served as President of the North American Membrane Society in 2002 - 2003, and is currently a member of the Board of Directors. He was elected a Fellow of the American Institute of Medical and Biological Engineers, the American Institute of Chemical Engineers, and the American Association for the Advancement of Science. Dr. Zydney has received Excellence in Teaching Awards from both the University of Delaware and the Penn State Engineering Alumni Society, and he is a past recipient of the Distinguished Teacher Award and the Outstanding Young Faculty Award from the American Society of Engineering Education.

<http://www.che.psu.edu/faculty/zydney/>

### “Purification of Plasmid DNA for Gene Therapy and Vaccines -- New Opportunities for Membrane Technology”

•**ABSTRACT:** There is growing interest in using plasmid DNA for gene therapy applications and for the development of DNA-based vaccines against viruses like Zika and flu. However, existing methods for DNA purification are inadequate for large-scale commercial production of these ground-breaking biotherapeutics. This talk examines the possibility of using membrane ultrafiltration for the purification of supercoiled plasmid DNA. DNA transmission during ultrafiltration occurs by the flow-induced elongation of the plasmid associated with the converging flow field into the membrane pores. This enables the effective separation of different topological isoforms of DNA based on differences in their conformational flexibility. New opportunities for enhancing DNA purification were identified using backpulsing to reduce fouling and using novel membranes with controlled pore morphology to pre-stretch the DNA in the elongation flow, thereby minimizing DNA trapping at the pore entrance. These results clearly demonstrate the potential of using membrane systems for commercial-scale purification of DNA.

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April 19, 2018 – CBIS Auditorium @ 9:15 AM  
Coffee & pastries – 8:45 AM – CBIS Gallery

### “The Artificial Kidney – From Hemodialysis to an Implantable Bioartificial Device”

•**ABSTRACT:** Prior to the 1960's, a diagnosis of total kidney failure meant a life-expectancy of less than 2 weeks. Today, nearly one million people with chronic kidney failure are kept alive by the artificial kidney. This talk will review some of the key technical developments that led to successful treatment of kidney disease using the artificial kidney (also known as hemodialysis), with a specific focus on the dialysis membrane that is at the heart of current devices. The development of novel membrane structures has provided better biocompatibility while significantly enhancing the removal of uremic toxins, e.g., using asymmetric membranes with very thin selective layers. Recent efforts in our group have focused on the development of an implantable bioartificial kidney, taking advantage of new approaches in MEMS technology to develop membranes with slit-shaped pores that can facilitate removal of beta-2-microglobulin, an important uremic toxin. We are now focused on designing a compact implantable device that can successfully replace normal kidney function. Initial animal studies are highly encouraging and could lead to major improvements in the treatment of individuals with chronic kidney disease.