

**PUBLISHER AND  
EDITOR-IN-CHIEF**

Kristine Chin  
(212) 591-7662  
[krisc@aiche.org](mailto:krisc@aiche.org)

**MANAGING EDITOR**

Cynthia F. Mascone  
(212) 591-7343  
[cynmt@aiche.org](mailto:cynmt@aiche.org)

**SENIOR EDITOR**

Rita L. D'Aquino  
(212) 591-7317  
[ritad@aiche.org](mailto:ritad@aiche.org)

**ART DIRECTOR**

Jose Andrade  
(212) 591-8678  
[josea@aiche.org](mailto:josea@aiche.org)

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(212) 591-7337  
[kares@aiche.org](mailto:kares@aiche.org)

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Alice Schwade

**REGULATORY  
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William A. Shirley  
(888) 674-2529  
[envtllaw@earthlink.net](mailto:envtllaw@earthlink.net)

**PATENT LAW  
EDITORS**

M. Henry Heines  
(415) 576-0200  
[mhh@townsend.com](mailto:mhh@townsend.com)

Frank C. Eymard  
(504) 585-0449  
[eymardfc@arlaw.com](mailto:eymardfc@arlaw.com)

**CLASSIFIED  
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Denise Deluca-Mallon  
(212) 591-7170  
[denid@aiche.org](mailto:denid@aiche.org)

**AIChE**

AMERICAN INSTITUTE OF  
CHEMICAL ENGINEERS

THREE PARK AVENUE  
NEW YORK, NY  
10016-5991  
[www.aiche.org](http://www.aiche.org)

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# Guest Editorial

## Generality and Uniquity

The profession of chemical engineering is changing more rapidly, and possibly more radically, than at any time in its history. The American Institute of Chemical Engineers is currently contending with difficulties that are exacerbated by these changes. Yet, in looking back and then forward, I find much cause for optimism.

Chemical engineering has always been characterized by its generalizations, which have made it possible for the profession to adapt seamlessly to new materials, new processes, new products and new applications for over a century. However, it is the unique skills of chemical engineers relative to chemists and other engineers, rather than these generalizations, that are responsible for the new demands for their services. What are these unique skills? They include a working knowledge of thermodynamics that encompasses all materials and phases, and continuous, as well as batch systems, and in particular the ability to make material-and-energy balances involving chemical changes, of fluid flow, heat transfer, and mass transfer that encompasses non-Newtonian fluids, packed beds, fluidized beds, and mixing; the performance of continuous and batch reactors, of physical and chemical methods of separation and of integrated systems and applied economics in connection with process and product design, including their control. These skills, as well as the generalizations, have proven readily adaptable for biochemical processing, food processing, solid-state electronic-materials processing, biomedical applications, and environmental control, and at the micro-scale and nano-scale, as well as the macro-scale.

With few exceptions, chemists have no preparation in fluid mechanics, heat transfer, mass transfer, and continuous processing. On the other hand, the graduates of most of the other engineering disciplines do not have a working knowledge of chemistry or of non-ideal fluid-mechanical and thermodynamic behavior. Accordingly, new products that involve continuous processing, chemical conversions, and/or non-ideal behavior create a niche and an opportunity for chemical engineers. Their unique preparation for such tasks is slowly gaining recognition in many industries that are not ordinarily or primarily identified as "chemical."

The employment of a significant fraction of chemical engineering graduates, often in small numbers, by a large number of firms that are not identified as "chemical" poses a new problem for the AIChE — namely, how to communicate with, and be relevant to, these relatively isolated individuals. Membership may be of particular importance to them because of their isolation from the chemical engineering community at large, but they may not realize that. The AIChE would also appear to be well-placed to call the unique capabilities of chemical engineers to industrial employers who are not aware of these capabilities. These considerations pose a challenge of immediate and critical importance to the AIChE.

Dr. Stuart W. Churchill,  
University of Pennsylvania,  
[churchil@seas.upenn.edu](mailto:churchil@seas.upenn.edu)

