

AICHE JOURNAL

VOL.48, NO.12 DECEMBER 2002

The AIChE JOURNAL, a monthly publication of the American Institute of Chemical Engineers, is devoted to fundamental research and developments having immediate or potential value in chemical engineering.



www.iche.org

Editor

Stanley I. Sandler

Publisher and Executive Editor

Haeja Lim Han

Associate Editors

Mark A. Barteau

Edward L. Cussler

Ignacio Grossmann

Julio M. Ottino

Sankaran Sundaresan

Copy Editor

Arthur H. Baulch

Editorial Assistants

Sally Mahon

Jed Hazlett

Cover Design

Fran Fresquez

Consulting Editors

Rakesh Agrawal

Separation Processes

Ilhan A. Aksay

Materials Processing

Juan Jose de Pablo

Computational Research

L. S. Fan

Particle Technology

Carol K. Hall

Thermodynamics

Eric W. Kaler

Colloidal Phenomena

George E. Keller, II

Separations

Sangtae Kim

Information Technology

Michael T. Klein

Reaction Engineering

Frederick J. Krambeck

Reactor Engineering

Anton Middelberg

Biomedical Engineering

Ronald W. Rousseau

Crystallization

John H. Seinfeld

Environmental Engineering

Michael L. Shuler

Biochemical Engineering

Group Publisher

Stephen R. Smith

AIChE Journal (ISSN 0001-1541)

is published monthly by the

American Institute of

Chemical Engineers,

Three Park Avenue

New York, NY 10016-5991.

Manuscripts should be submitted

to the *AIChE Journal* Editorial Office

Dept. of Chemical Engineering

University of Delaware

Newark, DE 19716-3110

Tel 302.831.6858

Fax 302.831.3226.

E-mail: aichej@che.udel.edu

The statements and opinions in the

AIChE Journal are those of the

contributors, and AIChE assumes

no responsibility for them.

Annual subscription rates
are as follows.

Print version only:

N. American members, \$105

International members, \$200

N. American nonmembers, \$950

International nonmembers, \$1,045

Online version only:

Members, \$150

Nonmembers, \$1,045

Print plus Online:

N. American members, \$170

International members, \$265

N. American nonmembers, \$1,185

International nonmembers, \$1,280

For subscription, e-mail: xpress@aiiche.org

or phone: 1-800-242-4363 (Toll Free) or

1-212-591-8100

Postage for domestic and international
mailing paid at New York City and addi-
tional mailing offices.

Copyright © 2002 by the American
Institute of Chemical Engineers.

POSTMASTER: Send change

of addresses to *AIChE Journal*

Three Park Avenue

New York, NY 10016-5991.

Authorization to photocopy for internal
or personal use is granted by AIChE for
libraries and other users registered with
the Copyright Clearance Center (CCC),
provided that a fee of \$25.00 per article
is paid directly to CCC, 222 Rosewood
Drive, Danvers, MA 01923. For its
digital access, contact CCC by visiting
rightslink.copyright.com/. This consent
does not extend to copying for general
distribution, inclusion in a publication,
or resale, promotion and advertising.