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## Separation Science and Technology

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### Foreword

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## Foreword

This special issue titled, “Advances in Membrane Science at Engineering with Membranes 2008,” is a collection of the leading research presentations given at the Engineering with Membranes 2008 Conference held in Algarve, Portugal. The Engineering with Membranes series of conferences is unique as it truly focuses on engineering aspects of membrane science and technology. Each meeting has a defined theme around which the technical program is organized. To date there have been five Engineering with Membranes meetings. Table 1 summarizes details of these meetings.

In keeping with the theme of the 2008 meeting, we organized a session titled “Responsive Membranes,” sponsored by the United States National Science Foundation. The focus of this session was to highlight the tremendous potential applications that exist for multi-functional membranes. These multi-functional membranes exhibit separation and catalytic properties. In some cases, the use of external stimulation or changes in environmental conditions such as temperature, ionic strength, etc. induces reversible changes in membrane barrier properties and functions.

The first five papers in this special issue describe the development of new, efficient membranes for water treatment, which is a major societal concern. Lewis et al. describe a platform for immobilization of chemical species in membranes that display catalytic activity. They have developed membranes that can dechlorinate trichloroethylene and 2,2'-dichlorobiphenyl in wastewaters. Geismann et al. describe a surface modification that yields membranes that respond to both pH and temperature. The pores of their membranes could be opened (closed) reversibly by increasing (decreasing) temperature or decreasing (increasing) pH. Asatekin and Mayes describe nanofiltration membranes where the degree of polymer swelling, through changes in solution ionic strength, may be used to “adjust” the effective pore size and thus the rejection properties of the membrane. Finally Tomer et al. and Bordawekar et al. describe two different strategies to develop membranes that respond to changes in temperature. These membranes can be made to switch between a hydrophilic and hydrophobic state, thus minimizing fouling.

**Table 1.** Details of the Engineering with Membranes series of conferences

Date	Location	Theme
1992	Garmisch-Partenkirchen, Germany	Engineering of membrane processes
April 1994	Il Ciocco, Italy	Environmental applications
June 2001	Granada, Spain	Small scale applications, hybrid processes and gas/vapor separations
May 2005	Camogli, Italy	Medical and biological applications
May 2008	Algarve, Portugal	Process performance improvements through control of membrane morphology at the nanoscale

The remaining three papers in this special edition describe other important areas of membrane research. Two papers focus on treating gas phase streams. Nistor et al. describe the development of an organic-inorganic CO<sub>2</sub> selective membrane. Lue et al. describe the simultaneous removal and recovery of volatile organic compounds from nitrogen streams using vapor permeation. Finally, a second paper by Lue et al. returns to the topic of water treatment using ceramic microfiltration membranes. Taken together the eight papers in this special issue address two significant societal challenges: water treatment and removal of greenhouse and other gases from vapor streams.

We hope that you enjoy this special issue of Separation Science and Technology as much as we enjoyed listening to the presentations at the Engineering with Membranes Meeting. We also acknowledge the National Science Foundation, which enabled participation by researchers in the United States.

*Sincerely,*

*Guest Editors*

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