

## Preface

---

The challenges that the chemical industry and research institutions face are increasing. The cost-efficient and environmentally sound conversion of natural resources into fuels, chemicals, and energy require innovative solutions. Catalysts are essential to these processes, and the subjects of the chapters presented here reflect this.

In two separate chapters, Robert Davis, Eric Dorskocil, and Shailendra Bordawekar (University of Virginia), and Yoshio Ono (National Institution for Academic Degrees, Japan) and Toshihide Baba (Tokyo Institute of Technology) review catalysis by solid bases. These reviews reflect the interest of catalyst researchers in this area. Although acid catalysis is much more widely studied and applied industrially, there are key reactions that require base catalysts, such as aldol condensations. In some cases, the synthesis of heterogeneous base catalysts to replace aqueous base catalysts can have positive environmental effects by eliminating wastewater streams that are otherwise produced. The challenge is to maintain industrially practical selectivity and activity without significant deactivation.

Masato Machida (Miyazaki University) has provided a review of solid sorbents for  $\text{NO}_x$  removal. These materials can be used in conjunction with catalytic reduction, especially when the  $\text{NO}_x$  concentrations are low. Carbons, zeolites, and modified aluminas can be used – both in stationary and mobile sources. He shows how the  $\text{NO}_x$  separation and catalytic reduction can be combined into a cyclical process for  $\text{NO}_x$  control.

P. Aghalayam, Y.K. Park, and D.G. Vlachos (University of Massachusetts) review progress in catalysts for the partial oxidation of light alkanes. Most of the interest in this area, and the focus of this review, is on the conversion of methane. However, the authors have expanded their review to oxidative dehydrogenation of ethane and other alkanes. In an closely related chapter, Akifummi Ueon (Shizuoka University) describes recent work in the partial oxidation of methane, with a special focus on silicomolybdic acid catalysts. These solid acids are one of several classes of catalysts being investigated for this process, and they are more selective for oxygenates such as formaldehyde and methanol – both industrially important intermediates now produced by other processes.

Finally, Burt Davis and Yongqing Zhang (University of Kentucky) have reviewed the status of indirect liquefaction, and the critical role that catalyst development must play in bringing these processes to wider commercial practice. This review clarifies the relationships among the wide range of

processes that have been developed and offers insight into the challenges that remain.

Volume 16 is underway and I look forward to bringing it to you. As always, comments are welcome.

James J. Spivey  
Research Triangle Institute  
Research Triangle Park, NC  
USA  
Email: [jjs@rti.org](mailto:jjs@rti.org)