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Preface

Despite a SARS-related postponement, the International Conference on Materials for Advanced Technologies ICMAT 2003, organized by the Materials Research Society (MRS) of Singapore, brought about 1600 delegates to Singapore. This special volume of "Catalysis Today" contains 12 selected contributions from Symposium C "Materials Design in Catalysis" of this conference. The format of this symposium was part workshop, with keynote lectures summarizing the state of the art in a particular field, and part scientific discussion meeting, where the latest results were presented.

The opening day of the meeting was devoted to bio- and enzymatic catalysis. This emerging application will certainly play an increasingly more prominent role in catalysis towards fine chemicals, and perhaps also for some bulk commodities such as bio-alcohol. In this volume, we are able to present an enlarged version of T. Matsuda's keynote on enzymatic reactions in supercritical CO_2 and three case studies by M. Ikunaka which try to answer the question: what is required to make enzymatic reactions viable in industrial processes? Suitable reactions have to have high volume efficiency, the enzymes used should not be inhibited by high product concentrations, and the products have to be recoverable without recourse to chromatographic techniques. That all this can indeed be achieved is documented in the paper by Ikunaka.

Another important topic at the meeting was progress with catalytic converters for combustion engines, and two of the selected papers address the issues in this field. T. Kanezawa summarized recent developments from the research laboratories of Toyota Motor Corporation. He discussed regenerative hydrocarbon absorbers based on modified zeolites, as well as new avenues to solve the NO_x problems in lean-burning engines through intermediate storage as nitrate, and desorption–decomposition to N_2 in pulses with reducing composition. Such a technology requires an advanced motor management. Nevertheless, this can be done, and some of the described developments are already in daily use in ultra-low emission (ULEV) or near zero emission (NZE) vehicles sold by Toyota. The contribution by Hadi and Yaakob highlights the state of catalysis research in Malaysia.

Several presentations and posters were devoted to photocatalysis using TiO_2-based materials: the contribution by Nonami et al. provides a good example how intelligently designed catalytic composite materials can be used to improve indoor air quality, and even help maintain sterility in hospitals.

A number of contributions belong to the theme of "green" chemistry. A shorter synthesis path and more environmentally acceptable reactions can be achieved through improved or novel catalysts, notably multi-functional materials with mesoporous structure. Representative examples are the papers by Srinivas et al. on transesterification over titano-silicate molecular sieves, Zaidi and Pant on an improved catalyst for the methanol-to-gasoline reaction, Selvam and Dapurkar on GaMCM-48 as a novel catalyst for *tert*-butylation of phenol, and Ravindra et al. on the highly selective isomerization of α-pinene oxide to campholenic aldehyde over Al-MSU and B_2O_3 catalysis.

Most of the topical reviews by the keynote speakers could not be included in this volume, but they offered much basis for discussions. We will only mention one contribution, by J. Müller (Südchemie AG). He addressed under the title "From gas to chemicals: A paradigm changed by innovation" the suddenly very acute problem of depleting oil reserves, which will already in the near future force a change in feed stocks for the chemical industry. The utilization of methane and the development of a C1-chemistry will become one of the major challenges for the industry in this decade.

We cannot mention all the contributions, but we want to thank all presenters and all participants: the meeting provided ample opportunities for learning, discussion, and for personal interactions. Our sincere thanks go also to the referees and to the editor, Professor Julian Ross, who helped with advice and encouragement throughout the preparation of this special volume.

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