

## Foreword

The selective reduction of nitrogen oxides by hydrocarbons under lean-burn conditions has become a very lively area of research in recent years both in academic and in industrial laboratories. Volume 22, No. 1 (1994) of *Catalysis Today* presented a very valuable and comprehensive overview of the current status of research on this topic in Japanese laboratories. The present issue of *Catalysis Today* is intended to be complementary to this earlier issue and so it consists of contributions from Europe and the USA in which the purpose is to provide a reasonably balanced overview of both the academic research which is being undertaken and the industrial perspective on current research together with an assessment of the future challenges.

The first contribution is from J.N. Armor, who has responded to the challenge to provide a critical analysis of where we are at, where we are going, and perhaps most importantly, where we should be going. His message is summarised in the sentence “Creative scientists need to focus their wisdom on inventing new catalyst compositions that will allow one to break away from the current limits....”. A.P. Walker has provided an excellent and comprehensive review of mechanistic studies on the ubiquitous Cu/ZSM-5 system. All the main mechanistic schemes have been considered and the evidence for and against each has been critically assessed. Also on the theme of Cu/ZSM-5, K.C.C. Kharas, Di-Jia Liu and H.J. Robota, who have published some very elegant work on the use of in situ EXAFS to characterise these catalyst systems, have written a review of the structure-function properties of Cu/ZSM-5 catalysts in which they describe their work and assess the pos-

sible role of adsorbate interactions in the reaction mechanism. J.N. Armor has made a major contribution to the subject of selective NO<sub>x</sub> reduction by his work on methane as a reductant. In this contribution he has brought all this information together with other related published work and provided a very valuable updated review of this very topical and important area. F. Radke, R.A. Koppel and A. Baiker discuss the formation of undesired by-products in this reaction over Cu/ZSM-5 catalysts and emphasise that the formation of such products depends on the experimental conditions. Lest the reader should worry about noxious compounds being catalytically converted into even more noxious products, it should be noted that under typical exhaust conditions the amounts of undesirable products is likely to be extremely low. K.A. Bethke, M.C. Kung, B. Yang, M. Shah, D. Alt, C. Li and H.H. Kung describe the work on metal oxide catalysts which has largely emanated from their laboratory and which shows that it is not essential to use zeolites as supports for these reactions. R. Burch and P.J. Millington present an overview of the current status of the work on Platinum Group Metal catalysts on non-zeolitic supports. Finally, J.C. Frost and G. Smedler present a viewpoint from the industrial side on the current status of emission control catalysts for lean-burn conditions, with particular emphasis on diesel powered vehicles. In this contribution they make the very important point that when consideration is given to the design of catalysts for the selective reduction of nitrogen oxides by hydrocarbons, it is essential to think of this in the context of the other requirements imposed on a modern diesel vehicle.

Finally, I should like to record my thanks to the contributors to this special issue. All have worked very hard to deliver contributions which are both

wide-ranging and thought provoking. If this issue has value, to them goes the credit.

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