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Preface

It is expected that increasingly stringent standards for NO_x emissions will be put in place during this decade. While NO_x emissions from vehicles that operate with near stoichiometric fuel–air mixtures can be controlled effectively with three-way catalysts, the control of NO_x emissions from fuel efficient vehicles operating with lean fuel–air mixtures is problematic. The detrimental effect of the large excess of oxygen in these cases on NO_x reduction efficiency poses a significant challenge to catalytic scientists and engineers. Emerging technologies include the selective catalytic reduction of NO by urea and ammonia (i.e., scaled-down versions of the corresponding successful technologies used for stationary sources), and the use of NO_x storage and reduction systems (i.e., a transient version of the selective catalytic reduction over precious metal catalysts). The successful application of these technologies for vehicles will require several hurdles to be traversed including, among others, NO_x reduction activity and selectivity, dynamic operability, safety, catalyst durability, and incremental fuel consumption.

This special issue of Catalysis Today focuses on the reduction of NO_x in the exhaust of lean-burn and diesel vehicles. Most of the contributions are from authors who presented papers at the North American Catalysis Society Meeting held in Cancun in June of 2003. The nine papers examine three approaches for lean NO_x reduction in vehicles: the steady-state selective catalytic reduction by hydrocarbons, the selective catalytic reduction by ammonia, and the transient selective catalytic reduction (lean NO_x traps). The contributions span model catalyst synthesis and activity testing, computational catalysis, and bench-scale reactor performance studies.

The editors thank the authors for their contributions. We remain optimistic that the catalytic engineering research will lead to successful deployment of NO_x reduction technologies in lean-burn vehicles.

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