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Preparing Ag/Al_2O_3 catalyst with AIN addition to improve the low temperature reduction activity of NOx by ethanol

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NOx removal from lean-burn exhaust remains a major challenge in environmental catalysis. Selective catalytic reduction of NOx by hydrocarbons (HC-SCR) is a potential method to remove NOx from lean-burn exhausts. The alumina supported silver catalyst (Ag/Al_2O_3) is deemed as one of the most effective materials for HC-SCR of NOx in excess oxygen. In particular, ethanol is extremely effective for the SCR of NOx over Ag/Al_2O_3. However, it is lack of activity in the low temperature range (<350 °C) still remains a problem. Since pioneer work of Burch et al, preparing a new type of Ag/Al_2O_3 catalyst to improve its low temperature performance by solvent-free mechanochemical method drew wide interest. In former study, the detailed preparing conditions including rotation speed and ball-milled time were carefully examined. The performance of selective reduction of NOx was evaluated by ethanol accompanied with byproduct monitor. A strong positive correlation between the amount of Al_{tetra} structures and N_2 production rate confirms the crucial role of Altetra in NOx reduction by ethanol. Thus, oriented designing and creating active site of HC-SCR (namely Ag-O-Al_{tetra} entity) at micro-scale in Ag/Al_2O_3 is promising to improve the conversion activity at low temperatures. In this study, AlN was used as precursor of Al_{tetra} entities to anchor isolated silver ions. After water thermal calcination of Ag/Al_2O_3 with AlN addition, the low temperature activity was truly improved. The catalytic performance of this catalyst was close to the H_2 effect.

Biography

Hua Deng has completed his PhD in Environmental Science from Research Center for Eco-Environmental Sciences (RCEES), Chinese Academy of Sciences (CAS) in 2015. He has been working as an Assistant Professor in Institute of Urban Environment (IUE), Chinese Academy of Sciences (CAS). His research interests include environmental catalysis and air pollution control such as selective catalytic reduction of NOx and catalytic combustion of Volatile Organic Compounds (VOCs).

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