

Understanding the catalytic deactivation of cyclic lean/rich aged Cu/CHA by investigation of copper metal sintering under modified aging conditions

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Cu/CHA catalyst has already been commercialized as a selective catalytic reduction (SCR) catalyst for NO_x abatement on diesel vehicles. However, the SCR catalyst bed in a typical diesel emission control system is placed very close to the diesel particulate filter (DPF), which is repeatedly exposed to periodic oxidizing/reducing conditions, resulting in a drastic deactivation. The crystallinity and textural properties of lean/rich aged Cu/CHA catalyst were well maintained after severe aging. On the other hand, the copper sintering was observed from TEM and HAADF-STEM. Consequently, the catalytic deactivation of the cyclic lean/rich aged Cu/CHA catalyst is thought to be due to copper sintering from the formation of local hot spot rather than the structural collapse of the zeolite support during the change from reducing to oxidizing condition. In this study, we intend to understand the copper sintering of lean/rich aged Cu/CHA catalyst under modified aging conditions which introduces the step of purging with inert gas between oxidizing and reducing conditions and to find solution to suppress copper sintering.