

### Simple physical mixing of zeolite prevents sulfur deactivation of vanadia catalysts for NO<sub>x</sub> removal

김도희<sup>†</sup>, 송인학, 이황호, 전세원, 한정우<sup>1</sup>, 김준우<sup>2</sup>, 변영철<sup>2</sup>, 고동준<sup>2</sup>

서울대학교; <sup>1</sup>POSTECH; <sup>2</sup>RIST

(dohkim@snu.ac.kr<sup>†</sup>)

NO<sub>x</sub> abatement has been an indispensable part of environmental catalysis for decades. Selective catalytic reduction with ammonia (SCR) using V<sub>2</sub>O<sub>5</sub>/TiO<sub>2</sub> is an important technology for removing NO<sub>x</sub> emitted from industrial facilities. However, it has been a huge challenge for the catalyst to operate at low temperatures, because ammonium bisulfate (ABS) forms and causes deactivation by blocking the pores of the catalyst. Here, we report that physically mixed H-Y zeolite effectively protects vanadium active sites by trapping ABS in micropores. The mixed catalysts operate stably at a low temperature of 220 °C, which is below the dew point of ABS. The sulfur resistance of this system is fully maintained during repeated aging/regeneration cycles because the trapped ABS easily decomposes at 350 °C. Further investigations reveal that the pore structure and the amount of framework Al determined the trapping ability of various zeolites. The SCR catalyst was successfully applied to the sintering furnace in the steelmaking factory of POSCO.