

NO_x Chemistry Over Rutile TiO₂(110) Surfaces

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We present our recent temperature-programmed desorption (TPD) study on catalytic reductions of NO_x such as NO, NO₂, and N₂O over rutile TiO₂(110) surfaces. Our results indicate that NO₂/NO readily reacts to give NO/N₂O desorption at the substrate temperature as low as 100 K/70 K. Interestingly, N₂O, however, does not dissociate into N₂ and O_{BBO} over the oxygen vacancy on the TiO₂(110) surface. Successive reduction of NO and NO₂ into N₂O and NO, respectively, leaves oxygen atoms on the TiO₂(110) surface in a form of O_{ad}, which can induce additional reductive channels of NO and NO₂ at higher temperatures up to 400 K. During the repeated TPD cycles of NO_x, our x-ray photoelectron spectroscopy (XPS) analysis indicates that no N atom accumulates on the TiO₂ surface.

Keywords: NO_x, NO, N₂O, NO₂, rutile TiO₂(110), catalytic reduction