

TiO₂/SiO₂ mixed phase oxide with enhanced selectivity in photocatalytic partial oxidation of dodecane for deNO_x application

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Photocatalytic conversion of dodecane was performed using TiO₂/SiO₂ mixed phase oxide prepared by sol-gel hydrolysis method for deNO_x application in diesel engine exhaust gas system. Photocatalyst was characterized by XRD, UV-Vis DRS, ICP, EA, XPS, and TEM. As a result, we confirmed the formation of Ti-O-Si bond, a representative evidence of TiO₂/SiO₂ mixed phase oxide and figured out Ti/Si ratio on the catalyst surface and in bulk. It seemed Ti-O-Si bond spread in less than 3nm scale due to quantum confinement effect like blue shift shown in UV-Vis DRS coming from isolated TiO₂ particle. More enhanced formaldehyde and OHC selectivity was obtained when TiO₂/SiO₂ mixed phase oxide was used than commercial TiO₂. Optimum Ti : Si ratio was not confirmed but it seems it is below 1 : 3. C1-C5 aldehydes were main oxygenated hydrocarbons (OHC) products. Small amounts of hydrogen were also produced.