Photo-assisted CO and NO redox reaction over CuO/CeO_2-TiO_2 Catalysts

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Reduction of NO_x with CO represents an effective and economical technique for simultaneous removal of NO_x and CO. The thermal catalytic NO and CO redox reaction requires relatively high temperatures up to 450 °C. Here, we investigate the photo-assisted catalytic NO and CO redox reaction over CuO/CeO_2-TiO_2 catalyst at lower temperature via in-situ DRIFT (Diffuse Reflectance Infrared Fourier Transform spectroscopy). Enhanced CO conversion (64.4%) under UV irradiation was achieved at 65 °C, compared with 11.5% in absence of UV light. Thermal catalysis became dominating at higher temperatures (200 °C). A promoting effect of ceria on NO reduction with CO has been revealed and rationalized on the basis of physical and chemical characterization results. XPS and TPR results showed that the electronic state interaction between Ce and the other two components (Ti and Cu) in the catalysts induced more efficient oxygen transport from ceria to copper species and resulted in higher oxygen vacancy concentration that leads to higher catalytic activity for the NO and CO reaction.



