

Preparation of CuO/CeO₂ nanoparticle catalysts and their catalytic decomposition for N-nitrosodimethylamine

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Ceria (CeO₂) has a unique catalytic property as an oxygen reservoir, which stores and releases oxygen via the redox shift between Ce⁴⁺ and Ce³⁺ under oxidizing and reducing conditions. CeO₂ nanocrystals and CuO/CeO₂ composites are prepared via precipitation method. Nitrosamines are well-recognized teratogens and carcinogens in animals and are considered potentially carcinogenic in humans. With a characteristic functional group of -N-N=O in their structure, nitrosamines can cause serious health risk even in trace amounts.

As far as reducing the -N-N=O functional group of nitrosamines from tobacco smoke, CuO/CeO₂ composite enhances the oxidization of NO to NO₂. NDMA, which contains -N-N=O functional group with two methyl groups, is selected as the model compound. In this work, the catalytic decomposition of N-nitrosodimethylamine (NDMA) on CuO/CeO₂ nanoparticles has been investigated by in-situ infrared technique and thermogravimetric analysis with a mass detector (TGA/MS).