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Enhanced Properties of Solid Solution (CeZr)O<sub>2</sub> Modified with Metal Oxides for Catalytic Oxidation of Low-concentration Methane

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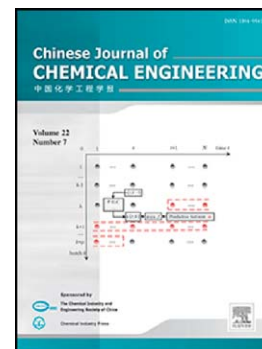
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**Catalysis, Kinetics and Reaction Engineering****Enhanced properties of solid solution (CeZr)O<sub>2</sub> modified with metal oxides for catalytic oxidation of low-concentration methane<sup>☆</sup>**

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**Abstract**

The solid solution (CeZr)O<sub>2</sub> catalyst was synthesized, and it was modified with metal oxides by incipient impregnation. Morphology and structure were characterized by X-ray diffraction, transmission electron microscope, nitrogen ad/desorption and H<sub>2</sub>-temperature program reduction techniques. The catalytic properties of methane oxidation were also investigated. The results showed that solid solution possessed a mesoporous structure and exhibited excellent catalytic performance. The activity of solid solution was improved effectively by nickel doping, and the optimal loading is 15 wt%. The stability of (CeZr)O<sub>2</sub> and modified (CeZr)O<sub>2</sub> indicated that the structure of pristine solid solution played a key role in promoting molecules diffusion and spatial confining oxide particle sintering.

Keywords: Methane; Catalyst; Solid solution; Metal doping.

**1. Introduction**

With the depletion of fossil energy resources, the demand for new energy resources is growing.

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