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CeO₂ supported on reduced TiO₂ for selective catalytic reduction of NO by NH₃

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Abstract

In this paper, a series of catalysts about CeO₂ active sites prepared using reduced TiO₂ (TiR) as supports were firstly used for selective catalytic reduction (SCR) of NO by NH₃. The catalytic performance evaluation results showed that the NO removal efficiency of CeO₂/TiR (CeTiR) was much higher than that of CeO₂/TiO₂ (CeTi). Hence, the aim of this study was to investigate the promotion mechanism of catalytic performance of CeTiR catalysts. The catalysts were characterized by XRD, BET, Raman, XPS, NH₃-TPD and H₂-TPR. The results of characterization revealed that CeO₂ had a strong interaction with oxygen vacancies of TiR supports. The strong interaction resulted in more Ce³⁺ formation and better redox properties for CeTiR catalysts. In addition, it was confirmed that the better redox properties of CeTiR could be considered as the major reason of its high SCR activity via L-H mechanism but not acid properties. We expected that this study could shed some lights on the development of SCR catalysts for improving the interaction between Ti support and active species for enhancing SCR reaction.

Keywords: reduced TiO₂; Ce³⁺ ions; oxygen vacancies; redox properties; SCR

1. Introduction

Nitrogen oxides (NO_x) remains as a major source of photochemical smog, acid rain, and the depletion of tropospheric ozone [1]. At present, the selective catalytic reduction (SCR) of NO_x with NH₃ in the presence of excess oxygen on commercial V₂O₅/WO₃ (MoO₃)/TiO₂ is the most

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