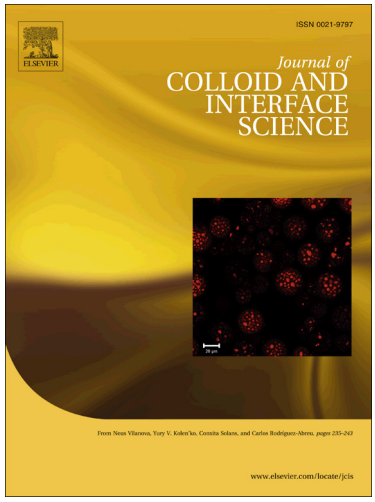

CeO_2 supported on reduced TiO_2 for selective catalytic reduction of NO by NH_3

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CeO_2 supported on reduced TiO_2 for selective catalytic reduction of NO by NH_3

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Abstract

In this paper, a series of catalysts about CeO_2 active sites prepared using reduced TiO_2 (TiR) as supports were firstly used for selective catalytic reduction (SCR) of NO by NH_3. The catalytic performance evaluation results showed that the NO removal efficiency of CeO_2/TiR (CeTiR) was much higher than that of CeO_2/TiO_2 (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, NH_3-TPD and H_2-TPR. The results of characterization revealed that CeO_2 had a strong interaction with oxygen vacancies of TiR supports. The strong interaction resulted in more Ce^{3+} 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 TiO_2; Ce^{3+} 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 NH_3 in the presence of excess oxygen on commercial V_2O_5/WO_3 (MoO_3)/TiO_2 is the most