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综述

用于 NH_3 选择性催化还原 NO 的非钒基催化剂研究进展

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- 摘要
- 参考文献
- 相关文章

摘要 NH3 选择性催化还原 NO (NH3-SCR) 技术在燃煤电厂烟气脱硝过程中有着多年的工业应用经验, 也是最有望实际应用于柴油车尾气 NOx 催化去除的技术之一. 鉴于目前工业化应用的 V2O5-WO3 (MoO3)/TiO2 催化剂体系应用于柴油车尾气净化仍存在着诸多问题, 开发新型、高效、稳定且环境友好的非钒基 NH3-SCR 催化剂体系成为 NOx 催化净化领域的研究热点. 以分子筛催化剂 (包括 Cu 基分子筛催化剂以及 Fe 基分子筛催化剂) 和氧化物催化剂 (包括 Fe 基氧化物催化剂、Mn 基氧化物催化剂以及其他非钒基氧化物催化剂) 为主线, 综述了近年来国内外有关非钒基 NH3-SCR 催化剂的研究进展, 较为全面地总结了该系列催化剂的 NH3-SCR 反应性能、活性中心结构、低温 SCR 活性改进、NH3-SCR 反应机理、抗 H2O 或抗 SO2 性能改善以及工业化应用的可行性, 并展望了该领域未来可能的发展方向和研究热点.

关键词: 选择性催化还原 烟气脱硝 柴油车尾气净化 非钒基催化剂 分子筛催化剂 氧化物催化剂 低温活性 反应机理

Abstract: Selective catalytic reduction of NO with NH_3 (NH_3-SCR) is a well-proven technique for the removal of NO_x from stationary sources such as coal-fired power plants, and is also one of the most promising techniques for the NO_x elimination from diesel exhaust under oxygen-rich conditions. Due to some inevitable disadvantages of the present V_2O_5-WO_3 (MoO_3)/TiO_2 catalyst for industrial use, many researchers focus on the development of novel, highly efficient, stable, environmental-friendly and vanadium-free NH_3-SCR catalysts. The research progress in the field of vanadium-free NH_3-SCR catalysts is reviewed, including zeolite catalysts (such as Fe-zeolite catalysts and Cu-zeolite catalysts) and oxide catalysts (such as Fe-based oxide catalysts, Mn-based oxide catalysts, and other vanadium-free oxide catalysts). Several aspects in this field, including the evaluation of catalytic performance, the structure analysis of active sites, the improvement of low temperature activity, the study of NH_3-SCR reaction mechanism, the enhancement of H_2O/SO_2 durability, and the feasibility analysis for industrial use, have been discussed in detail. The possible developing orientation and research interests in the field of vanadium-free NH_3-SCR catalysts are previewed.

Keywords: selective catalytic reduction, flue gas denitration, diesel exhaust purification, vanadium-free catalyst, zeolite catalyst, oxide catalyst, low temperature activity, reaction mechanism

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[1] 这个期刊审稿速度挺快，基本1个月就有结果了。图要求较高，编辑对稿子修改的也挺细致，能发现挺多作者的疏漏。发表出来的文章版面美观，期刊设计的挺亮。发表速度也挺快，论文基本从投稿到发表要半年吧。

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