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贫燃条件下丙烯选择还原一氧化氮新型锡锆固溶体催化剂性能

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摘要 采用双股江流共沉淀方法制备了锡锆固溶体DeNO_x催化剂，在反应气组成为1. 212*10~(-3) NO,1.095*10~(-3)C_3H_6和2.09%O_2,反应空速为17000h~(-1)条件下 ，含SnO_2为w(SnO_2)=60%的样品在350 ℃时有最大NO还原转化率71%。固定锡锆比 w(SnO_2)=60%，
采用尿素均相沉淀法制备的样品在相同测试条件下，350℃的最大 NO转化率达74%。对该样品在不同温度、不同氧气及丙烯浓度、不同反应空速及水 热处理条件下的NO还原性能进行考察。结果表明，
锡锆固溶体催化剂具有较高的热 稳定性和水热稳定性，
以及较好的抗氧性能和对高空速的耐受特性。结合对丙烯转 化率的分析，
锡锆固溶体上丙烯完全燃烧活性的抑制有利于提高NO的还原活性。

关键词 一氧化氮 催化 稳定性 氧化锡 锆 活性

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Catalytic Performance of Novel Sn_xSr_(1-x)O_2 Solid Solution Catalysts for NO Selective Reduction by Propene under Lean-burn Conditions

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Abstract A series of Sn_xZr_(1-x)O_2 solid solution catalysts was prepared by co-current coprecipitation method using ammonia solution as precipitation agent and calcined at 500 ℃ for 4 h in air. Among them, the sample containing SnO_2 [w (WnO_2) = 60%] showed the highest NO conversion of 71% at 350 ℃, with 1.212 * 10~(-3) NO, 1.095 * 10~(-3) C_3H_6 and 2.09% O_2 in He at a space velocity of 17000 h~(-1). In comparison, the sample SZ160E2 comprising SnO_2 [w (SnO_2) = 60%] was prepared by urea-based homogeneous precipitation method, which showed a higher NO conversion of 74% at 350 ℃. Furthermore, the catalytic performance of SZ160E2 was examined thoroughly with different concentration of oxygen and propene, or at different temperature and space velocity, and the performance under steam was studied as well. The results illuminated that Sn_x Zr_(1-x)O_2 solid solution catalysts could sustain moderate activity after calcined at a temperature above 800 ℃, at a high space velocity of 50000 h~(-1), in the presence of excess O_2 content of 8.0% (lean-burn condition) or after steam treatment for 12 h. The best C_3H_6/NO molar ratio for SZ160E2 was from 1.24 to 1.65 and in this region about 80% NO could be reduced to the harmless N_2 at 350 ℃. It was shown that Sn_xZr_(1-x)O_2 solid solution catalysts had good thermal stability and hydrothermal stability, and could be used under lean-burn conditions and a high space velocity. According to the conversion of C_3H_6 to CO_2 in NO- SCR reaction, we conclude that the combustion activity of propene was restrained and the activity for NO reduction was enhanced at the same time due to the insertion of zirconium ions into the crystal lattice of tin dioxide.

Key words NO CATALYSIS STABILITY TIN OXIDE ZIRCONIUM ACTIVITY

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