

Au/NTS-1 催化丙烯气相直接环氧化

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摘要 以高温氨气处理制得含氮微孔钛硅分子筛 (NTS-1) 为载体, 用沉积-沉淀法制得了一系列纳米金催化剂. 考察了纳米金催化剂在氢气和氧气共存下催化丙烯气相环氧化制环氧丙烷反应中的催化性能. 结果表明: 高温氨气处理钛硅分子筛 (TS-1) 载体降低了其酸性, 提高了纳米金催化剂制备中金的利用率和纳米金催化剂中金的分散度, 显著提高纳米金催化剂的催化活性. 载体酸性降低和载体表面 -NH₂ 配位效应增强了催化剂活性.

关键词: 金 含氮钛硅分子筛 环氧化 氮化 环氧丙烷 钛硅分子筛相

Abstract: Nitrogen-incorporated titanium silicalite-1 (NTS-1) was used to prepare a supported gold catalyst for direct gas-phase epoxidation of propylene using H₂ and O₂. The NTS-1 was synthesized by direct calcination of the TS-1 powder in a flow of NH₃ at high temperature. Gold catalyst supported on NTS-1 was synthesized by the deposition-precipitation method. The samples were characterized by X-ray diffraction, N₂ adsorption-desorption, diffuse reflectance ultraviolet-visible spectroscopy, inductively coupled plasma optical emission spectrometry, elemental analysis, X-ray photoelectron spectroscopy, and transmission electron microscopy. The results indicated that nitrogen was incorporated into the TS-1 framework, and that the NTS-1 preserved the multidimensional fatigue inventory (MFI) structure well. It was found that NH₃-treatment resulted in decreased acidity of the TS-1 zeolite support and improved both the Au capture efficiency and dispersion, which remarkably improved the catalytic performance. The enhanced activity was ascribed to the decrease in acidic surface sites and the ligand effect of the terminal NH₂ groups on the support surface.

Keywords: gold, nitrogen-incorporated titanium silicalite-1, epoxidation, nitridation, propylene oxide, titanium silicalite-1

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