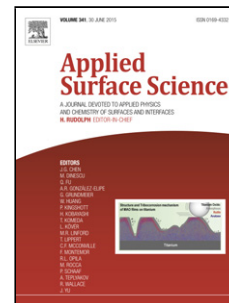


Accepted Manuscript

Title: Nickel-based xerogel catalysts: synthesis via fast sol-gel method and application in catalytic hydrogenation of *p*-nitrophenol to *p*-aminophenol

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PII: S0169-4332(16)30877-7
DOI: <http://dx.doi.org/doi:10.1016/j.apsusc.2016.04.125>
Reference: APSUSC 33126

To appear in: *APSUSC*

Received date: 3-2-2016
Revised date: 14-4-2016
Accepted date: 18-4-2016

Please cite this article as: Jin Feng, Qiang Wang, Dongliang Fan, Lirong Ma, Deli Jiang, Jimin Xie, Jianjun Zhu, Nickel-based xerogel catalysts: synthesis via fast sol-gel method and application in catalytic hydrogenation of *p*-nitrophenol to *p*-aminophenol, *Applied Surface Science* <http://dx.doi.org/10.1016/j.apsusc.2016.04.125>

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Applied Surface Science
Manuscript Draft

Manuscript Number: APSUSC-D-16-01120

Title: Nickel-based xerogel catalysts: synthesis via fast sol-gel method and application in catalytic hydrogenation of p-nitrophenol to p-aminophenol

Article Type: Full Length Article

Keywords: Ni-based xerogel catalysts; p-nitrophenol; hydrogenation; high selectivity; reutilization

Abstract: In order to investigate the roles of three-dimensional network structure and calcium on Ni catalysts, the Ni, Ni-Al₂O₃, Ni-Ca-Al₂O₃ xerogel catalysts were successfully synthesized via the fast sol-gel process and chemical reduction method. The crystal structure of three different catalysts was observed with X-ray powder diffraction (XRD). Transmission electron microscopy (TEM), scanning electron microscopy (SEM) and nitrogen adsorption-desorption were employed to investigate the role of network structure of xerogel catalysts and the size distribution of Ni nanoparticles. The catalyst composition was determined by inductively coupled plasma-optical emission spectrometry (ICP-OES) measurement and energy-dispersive X-ray spectroscopy (EDS). Temperature-programmed reduction (TPR) experiments were carried out to investigate the reducibility of nickel species and the interaction between nickel species and alumina. The catalytic hydrogenation of p-nitrophenol to p-aminophenol was investigated over the prepared nickel-based xerogel catalysts. The conversion of p-nitrophenol was monitored by UV spectrophotometry and high performance liquid chromatography (HPLC). The results show that the catalysts are highly selective for the conversion of p-nitrophenol to p-aminophenol and the order of catalytic activities of the catalysts is Ni < Ni-Al₂O₃ < Ni-Ca-Al₂O₃. The catalysts were recycled and were used to evaluate the reutilization.

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