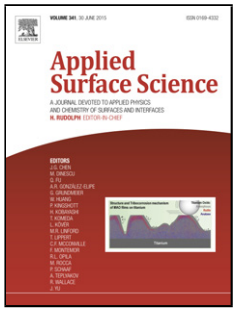


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# Size-controlled synthesis of $NiFe_2O_4$ nanospheres via a PEG assisted hydrothermal route and their catalytic properties in oxidation of alcohols by periodic acid

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## Abstract

A novel and facile approach for synthesis of spinel nickel ferrites ($NiFe_2O_4$) nanoparticles (NPs) employing homogeneous chemical precipitation followed by hydrothermal heating is reported. The synthesis involves use of tributylamine (TBA) as a hydroxylating agent in synthesis of nickel ferrites. Polyethylene glycol (PEG) 4000 was usedas surfactant. As-synthesized $NiFe_2O_4$ NPs were characterized by powder X-ray diffraction (XRD), transmission electron microscopy (TEM), $N_2$ adsorption-desorption isotherm (BET) and vibrating sample magnetometry (VSM). The XRD pattern revealed formation of cubic face-centered $NiFe_2O_4$ and TEM image showed spherical particles of sizes 2-10 nm. These $NiFe_2O_4$ NPs were used as magnetically recoverable catalyst in oxidation of cyclic alcohols to their corresponding aldehydes by periodic acid. This eco-friendly procedure affords products in very high yield and selectivity. The reusability of the catalyst is proved to be noteworthy as the material exhibits no significant changes in its catalytic activity even after five cycles of reuse.

Keywords: Tributylamine; polyethylene glycol; recoverable catalyst; cyclic alcohols; periodic acid

## 1. Introduction