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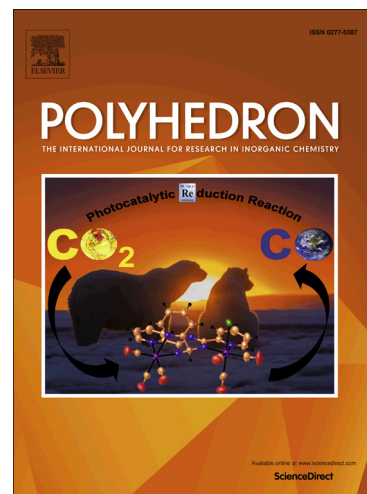
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Synthesis of rare pure phase Ni₃S₄ and Ni₃S₂ nanoparticles in different primary amine coordinating solvents

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ABSTRACT

Two nickel(II) complexes, namely piperidine (**1**) and tetrahydroquinoline (**2**) dithiocarbamate complexes were synthesized and characterized by infra-red spectroscopy, elemental analysis and thermogravimetric analyses. The single crystal X-ray structure of complex (**1**) was also elucidated. The as-synthesized complexes have been utilized as single source precursors to afford nickel sulfide nanoparticles Ni₃S₄, Ni₃S₂ and mixed phases via solvothermal decomposition in oleylamine (OLA), dodecylamine (DDA) and hexadecylamine (HDA) at different temperatures. Powder X-ray diffraction studies reveal that the temperature and capping agents play a significant role in determining the crystalline structure and chemical composition of the as-synthesized nanoparticles (NPs). Electron microscopy images showed formation of nanoparticles of various shapes ranging from spherical, tetrahedral and irregular shaped morphologies. Magnetization measurements indicated that Ni₃S₄ nanoparticles prepared at 230 °C using DDA display ferromagnetic behaviour, while rhombohedral Ni₃S₂ also prepared at 230 °C but using HDA, displayed paramagnetic property.

Keywords:

Nickel sulfide, single source precursor, magnetic property, crystalline structure.

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