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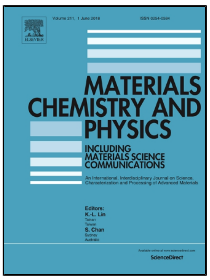

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Formation of Nickel Nanoparticles and Magnetic Matrix in Nickel Phthalocyanine by Doping with Potassium.

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Abstract

A method for synthesis of nickel nanoparticles in a magnetic nickel phthalocyanine anions matrix has been developed. The method is based on intercalation of potassium atoms to the nickel phthalocyanine (NiPc) polycrystalline powder at 300°C. The structure of (K_2NiPc) was investigated by using high-resolution transmission electron microscopy (HRTEM), X-ray diffraction (XRD) and X-ray absorption fine structure (XAFS) spectroscopes. Magnetic properties were studied by SQUID magnetometry and magnetic resonances methods. It is revealed that the resultant compound contains of 1 wt% Ni nanoparticles with the average size of 15 nm. The measured values of the magnetization and absorption of the ferromagnetic resonance considerably exceed the magnetism which can be attributed to metallic Ni nanoparticles. The obtained results indicate the presence of room temperature molecular ferromagnetism caused by anionic molecules of NiPc.

Keywords: nickel nanoparticles, phthalocyanine matrix, molecular magnetism, magnetic resonances and magnetic properties, HRTEM, XRD and XAFS study

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1. Introduction

Nanosized magnetic nanoparticles such as Fe, Co, Ni stabilized in metal-phthalocyanine (MPc) matrices are attracting attention because of their potential applications in optoelectronic devices organic semiconductors devices, etc [1-4]. Due to their strong absorption in the near infrared (NIR) region and