Comparative Local Analysis of Ni/Ni3C Nanoparticles Synthed with Oleylamine/Oleic Acid and Oleylamine/Palm Kernel Oil Ligand Pairs: Structural and Magnetic Properties.

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In recent decades, Ni/Ni3C nanoparticles have been a topic of interest, especially for their catalytic and magnetic properties, promising as electrocatalysis, for example [1]. These systems are usually obtained by chemical methods, in the presence of ligands responsible for controlling their structure and morphology [2]. In this work, we carried out a comparative study of the hyperfine interactions occurring in Ni/Ni3C nanoparticles, synthed by thermal decomposition in the presence of oleylamine/oleic acid and oleylamine/palm kernel oil ligand pairs, at 513 K, for 3 hours. The local analysis was performed using perturbed correlation spectroscopy (PAC) in the temperature range from 30K to 300K, using the 111Cd probe, implanted in the samples by diffusion, during the synthesis. The parameters of the hyperfine interactions were compared to the results obtained by XRD, TEM and magnetization, indicating the obtainment of Ni/Ni3c nanoparticles of the core-shell type, showing a higher Ni3C content, greater distribution and lower saturation magnetization for nanoparticles synthed with palm kernel oil compared to those obtained with oleic acid. In addition, the hyperfine parameters showed the existence of regions with a quadrupole frequency of 24 MHz and a magnetic hyperfine field of 1T in both samples, which may be indicative of carbon-deficient Ni3C regions, predicted in the literature [3].

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