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Advanced Materials 2018: Synthesis by hydrogen reduction and characterization of CuNiCo with nanoparticles content- E A Brocchi - Pontifical Catholic University of Rio de Janeiro

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Metals alloys are of great technological interest which can even increase if they're nanostructured. Also, it are often found within the literature, an equivalent proposed chemical synthesis methodologies obtain different sorts of materials with nanocrystal particle content. Then, the most objective of this work was to get a CuNiCo alloy, by an alternate procedure capable of generating nanostructured grains, followed by its preliminary characterization. it's been done by dividing the method into two steps the primary one is that the thermal decomposition of a nitrate solution [Cu(NO3)2, Ni(NO3)2 and Co(NO3)3] getting to obtain a homogeneous co-formed metal oxide. within the second step, these oxides are heated to the specified temperature and kept during a reductive flow of hydrogen, leaving the CuNiCo alloy as final product. The applied reduction temperatures were 300°C and 900°C. The materials obtained after each step were characterized by scanning microscopy (SEM) and energy dispersive X-ray detector (EDS). As a results of the primary step, it had been found that oxygen, Cu, Ni, and Co were, as desired, homogeneously distributed, as shown within the SEM elemental mapping. The after reduction obtained material present different shape and particle size, counting on the applied reducing temperatures. The more circular and greater size observed at 900°C confirms an increased sintering occurrence at a better temperature and therefore the EDS results indicate the expected composition for Co, Ni and Cu. The initial results given by transmission microscopy (TEM) have shown the presence of particles with spherical morphology and a homogeneous distribution of the weather , which are sharing an equivalent crystal structure. Also, it had been noted the presence of particles smaller than 100 nm within the CuNiCo alloy. Introduction: Much work is presently being done round the world to develop hydrogen and fuel-cell technologies in order that they're going to be cost-competitive in diverse applications. Platinum works well as a catalyst in hydrogen fuel cells; however, it's a minimum of two drawbacks therein it's expensive and degrades over time. Eliminating the valuable metal platinum would solve a big economic challenge that has thwarted the widespread use of large-scale hydrogen fuel-cell systems. a replacement catalytic material supported the element cobalt has been proposed as an alternate to platinum in recent years and might allow the manufacturing of cheaper and more durable hydrogen fuel cells. Cobalt is taken into account to be the primary catalyst made up of nonprecious metal with properties closely matching with those of platinum. Cobalt serves also as a model system for the macroscopic magnetic response; because the low to moderate crystal anisotropy allows the consequences of size, shape, internal crystal structure, and surface anisotropy to be observed during a single system. The low crystal anisotropy of cobalt also promotes their study as a model system for the consequences of size, shape, crystal structure, and surface anisotropy on their macroscopic magnetic response. a spread of methods for the preparation of magnetic colloid dispersions are reported. Cobalt is one among the foremost important ferromagnetic metals thanks to its three metastable phases with different crystallographic structures, namely, the hexagonal closed packed (hcp) phase, the face-centered cubic (fcc) phase, and therefore the epsilon phase.

Synthesizing metallic nanoparticles following wet-chemistry routes may be a powerful way of obtaining a reproducible macroscopic amount of homogeneous sample. Several wet-chemical methods are developed to synthesize cobalt crystals with different morphologies, for instance , pyrolysis, solvothermal and hydrothermal decomposition, microfluidic synthesis, modified polyol processes, and template-based methods. it's been reported that liquid-phase reduction methods are relatively simple and don't require special equipment. Moreover, they're considered to be less costly and quicker to implement, which are desirable qualities for future attempts of large-scale production.

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