Nanocomposites and nanomaterials

Obtaining of Cu/Cu_2O core-shell nanoparticles by spark erosion method

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Optimization of synthesis methods of composite nanostructures is a study of particular interest recently. Among them one the most important are core-shell nanoparticles, especially metal, such as noble metal or copper. Copper and copper oxide nanoparticles are low-cost (compared to Ag, Au) and have a wide application in different fields, due to their specific electric, magnetic [1], chemical and optical [2] properties. Thus, nanoparticles with metal core and semiconductor shell have enhanced properties and can be used in electronic, photovoltaic devices, etc.

The study is aimed on investigation of particle size and phase composition of Cu/Cu_2O core-shell nanoparticles. The mixture of Cu nanopowder and Cu/Cu_2O core-shell nanocomposite was obtained by spark erosion method in distilled water. Morphology and particle size were determined by TEM. Phase composition was investigated using X-ray diffraction and electron diffraction methods.

It was shown that obtained by spark-erosion method material contained Cu nanoparticles with size up to 10 nm and Cu/Cu_2O nanocomposites with size about 30-50 nm. It was found that powder demonstrated phoroluminescent properties. The proposed method has a lot of benefits, as for instance it does not need expensive equipment and specific synthesis conditions.

1. *H. Lii, X. Xiei, W. Wangi* et al. Room-temperature ferromagnetism in nanocrystalline Cu/Cu_2O core-shell structures prepared by magnetron sputtering // APL Materials.-2013.-**1**, N 4.-P. 106.

2. *A. Yang, S. Li, Y. Wang* et al. Fabrication of Cu_2O/Cu_2O core-shell nanoparticles and conversion to Cu/Cu_2O core–shell nanoparticles in solution. // Transactions of Nonferrous Metals Society of China.-2015.-**25**, N 11.-P. 3643-3650.