Manufacture of CuO Microtubes Coated With CuO Nanowires Using Discarded Materials

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Copper oxide II (CuO) is a p-type semiconductor material with promising applications in several areas of nanotechnology such as sensors, catalysts, solar cells and others. The advantages of this metal oxide include its non-toxic nature, abundance of its precursor materials and cost-effective synthesis routes. In addition, CuO is stable, has interesting properties, such as complex magnetic phases, and is the basis of the families of superconductors currently under study. In this work CuO microtubes coated with CuO nanowires were synthesized by the thermal oxidation method using low cost materials, specifically Copper (Cu) microwires removed from discarded cell headsets. A new experimental methodology, which joins two temperature thresholds in a single process, was performed to allow the efficient joining of two structures of different scales in a micro/nanostructured arrangement. Thus, 60 μm Cu microwires, covered with a thin polymeric layer of carbon (C) of 6 μm, underwent thermal treatments in the temperature range of 300-700 °C. The structural and morphological properties of the samples were investigated by Scanning Electron Microscopy (SEM), X-ray Dispersive Energy Spectroscopy (EDS), Raman Spectroscopy and X-Ray Diffraction (XRD). Samples synthesized through the new experimental methodology present on their surface an amount of C of 43.21%. Thus, the results reveal the importance of the thin polymeric layer, which acts as a catalyst during the heating process, contributing to the growth of nanowires with a length of 10 to 15 μm.