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Electrical properties of single ZnO nanowires prepared by wet and dry methods

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In the last decades, nanowires have become the building blocks for new nanotechnology devices. Compared to bulk materials, nanowires have high aspect ratio and unique electrical, optical and magnetic properties that can be easily tuned by controlling the parameters involved in the growth process. ZnO is an n type semiconductor material with a direct wide band gap (3.3 eV) and a large exciting binding energy (60 meV) that crystallizes in two main phases, hexagonal wurtzite and cubic zinc blende. ZnO nanowires are the perfect candidates for many applications, such as gas sensor, light-emitting diodes, field effect transistors, photo-detectors, photocatalysts, solar cells and many others. In this work, arrays of ZnO nanowires have been prepared using wet and dry methods (electrochemical deposition, chemical bath deposition and thermal oxidation in air). The structural (X-ray diffraction, transmission electron microscopy), optical (reflection, photoluminescence), morphological (scanning electron microscopy), compositional (energy-dispersive X-ray spectroscopy) and electrical properties (current-voltage characteristics) were investigated in order to increase their performance in different applications. By employing lithographic techniques (photolithography and electron beam lithography) and thin films deposition techniques, single ZnO nanowires prepared by wet and dry methods, were integrated into devices like field effect transistors. We observed that the growth method influence the structural, morphological, optical and electrical properties of the nanowires. Thus, the method used to synthesize the nanowires represents the key in obtaining high performance electronic devices.

Biography

Costas A has completed her PhD at University of Bucharest, Romania. She is a young Researcher with 10 publications that have been cited over 20 times, and her publication H-index is four. She is currently working as a Researcher at National Institute of Materials Physics and she is involved as a team member in more than five national research projects.

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