

Synthesis of vertically conformal Cu/ZnO core-shell nanowire arrays by electrophoresis assisted electroless deposition

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Recently, many studies about one-dimensional hetero-nanostructures have conducted so far as versatile multifunctional building blocks. Especially, Cu/ZnO core-shell nanowires (NWs) have attracted interest due to their diverse potential applications such as electronic device, sensors, catalyst, solar cells, etc. However, most of studies related to the above core-shell NWs have been mainly focused on demonstration of their feasibility for potential applications instead of establishment of the systematic and robust synthesis routes for these nanostructures. To address this issue, we introduce an electrophoresis assisted electroless deposition (EAELD) method Cu on ZnO NWs. For this work, the conformal CuO seeds on long ZnO NWs were achieved by the electrostatic attachment of Cu particles in the colloidal electroless solution and the subsequent thermal oxidation. Then, the conformal CuO shell to core ZnO NW could be obtained by kinetic-limited deposition process with colloidal CuO particles in electroless solution. Finally, the superiorities of EAELD to form vertical Cu/ZnO NWs core-shell arrays are discussed through comparison with the conventional electroless deposition (ELD).