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# Impact of Rapid Photothermal Processing on Properties of ZnO Nanostructures for Solar Cell Applications

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## Abstract

The nanotechnology with chemical deposition (CD) and rapid photothermal processing (RPP) of nanostructured ZnO thin films for solar cell applications was elaborated. The influence of growth processes and the impact of RPP on surface morphology, particles size and resistivity values are presented and discussed. The ZnO thin films were deposited on silicon substrates by chemical deposition method at room temperature and normal pressure. The obtained thin films were rapid photothermal processed in vacuum and N2 ambient. Nanostructures of the deposited films were optimized by adjusting various growth parameters: concentration of zinc complex solution, temperature of aqueous solution of anions and RPP regimes. Structural and electrical properties were investigated by energy dispersive X-ray (EDX) spectroscopy, scanning electron microscopy (SEM), electrical resistivity measurements. Electrical resistivity measurements showed that the room temperature resistivity of 105 Omega-cm for as-deposited ZnO, decreased to 103 Omega-cm after rapid photothermal processing. The impact of RPP temperatures was found to have an important role in the formation of ZnO nanostructures properties for solar cells applications and photoluminescence enhancement. The highest intensity of photoluminescence was obtained at 650degC RPP temperature. The experimental results shown that by RPP is possible to control the surface morphology, electrical properties and photoluminescence of nanostructured zinc oxide thin films as active component and antireflection coating of the solar cells,