

Effect of temperature and pretreatment on the morphologies of ZnO nanostructures in a single reactor: structural and optical properties

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Morphological evolution in the ZnO nanostructures, were observed by varying the temperature and pretreatment step on silicon substrate by the thermal evaporation using a high purity metallic zinc powder in the presence of oxygen without the use of any catalyst or additives. The detailed morphological studies show that the local substrate temperature, pretreatment and distance of the substrate from the source material may have serious impact on the morphologies of the deposited structures. The HRTEM images and X-ray diffraction patterns confirm that the deposited structures are single crystalline with the wurtzite hexagonal phase. The detailed optical properties were examined using the Raman scattering and room temperature photoluminescence measurements which indicated that the as-grown products have good crystallinity with very less or no structural defects and exhibit good optical properties.