Photoluminescent properties of ZnO nanodisks grown in solution

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Zinc oxide has recently gained much interest because of its potential use in many applications. In the past decade, well-defined ZnO nanostructures with various morphologies such as nanowires and nanorods, nanobelts, nanotetrapods, nanotubes, and nanodisks have been documented. In this work, we demonstrate the low-temperature solution growth of ZnO nanodisks by employing a solvent effect. Using mixed solvent of water and ethanol (VW/VE=1/1) as a reaction medium, ZnO nanodisks were successfully grown from the solution containing equimolar zinc acetate and methenamine. XRD, SEM, and TEM results indicate that obtained ZnO nanodisks are of single-crystal wurtzite structure growing along < 0110> crystallographic directions within polar {0001} planes. An intense sharp ultraviolet excitonic emission at 380 nm together with a weak broad green emission are observed under the excitation of a 325 nm He-Cd laser, demonstrating the high crystal quality of the prepared nanostructures.