

Band-edge photoluminescence in nanocrystalline ZnO:In films prepared by electrostatic spray deposition

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Abstract: ZnO:In films are successfully prepared by using the electrostatic spray deposition technique. X-ray diffraction indicates that the ZnO:In films have a polycrystalline hexagonal wurtzite structure with lattice parameters $a=3.267$ Å and $c=5.209$ Å. Photoluminescence properties of the films are investigated in the temperature range of 11.6-300 K, showing strong luminescence in the whole range of temperature. The temperature dependence of the photoluminescence are carried out with full profile fitting of spectra, which clearly shows that the ultraviolet (UV) emission in In-doped ZnO films at low temperature are attributed to emission of a neutral donor-bound exciton (D^0X) and recombination of donor-acceptor pairs (DAP), while the UV emission at room temperature originates from radiative transition of an electron bound on a donor to the valence band. © 2005 Elsevier B.V. All rights reserved.

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