

## Field Emission Properties of Non-catalytically Grown ZnO Nanostructures

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In this paper, we report the synthesis, structural, optical and field emission properties of ZnO nanostructures grown by thermal evaporation process in the temperature ranges of 450–650 °C. The detailed structural and optical observations revealed that the grown products are possessing single crystallinity with the wurtzite hexagonal phase and good optical properties. The performances of the field-emission devices based on the as-grown products have also been characterized. Vertically-aligned hexagonal-shaped ZnO nanorods show the turn-on electric field at about 5.8 V/μm with the emission current density of 0.061 mA/cm<sup>2</sup> which was achieved at the electrical field of 9.0 V/μm. The current density shows no saturation in the current while the field enhancement factor 'β' was estimated to be about  $\sim 2.081 \times 10^3$ . Flower-shaped nanostructures are exhibiting the turn-on field of 4.5 V/μm with the emission current density of 0.073 mA/cm<sup>2</sup> which was achieved at the electrical field of 7.1 V/μm. In this case also, the current density shows no saturation in the current and the field enhancement factor 'β' was estimated to be about  $\sim 2.9 \times 10^3$ .