Enhanced field emission of ZnO nanoneedle arrays via solution etching at room temperature

ZnO nanoneedle arrays (ZnO nns) were synthesized by a facile two-step solution-phase method based on the etching of pre-synthesized ZnO nanowire arrays (ZnO nws) with flat ends at room temperature. Field emission measurement results showed that the turn-on electronic fields of ZnO nns and nws were 2.7 and 5.3 V μm⁻¹ at a current density of 10 μA cm⁻², and the field enhancement factors were 4939.3 for ZnO nns and 1423.6 for ZnO nws. The enhanced field emission properties in ZnO nns were ascribed to the sharp tip geometry.

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