Novel and Facile Solution Route for Large-Scale Selective Area Growth of Well-Aligned ZnO Nanorods on ZnO/Si substrate: Structural Optical and Field Emission Properties

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We demonstrate a low cost and novel solution method for selective area growth of well-aligned ZnO nanorod arrays on pre-patterned ZnO/Si substrates. Conventional photo lithography is used to develop square and circular patterns with the help of polymer mask. Field emission scanning electron microscopy analysis reveals that the nanorods are well aligned and perfectly grown on the selected area. It also shows that the grown nanorods have an average diameter and length of ~45±5 and ~650±50 nm, respectively. Structural analysis reveals that the ZnO nanorods are single-crystalline in nature and grown along (0002) direction. The room temperature photoluminescence spectrum shows a strong ultra violet emission at 381 nm and a broad deep level visible emission at 580 nm. The device performance of the ZnO nanostructures was also studied using its field emission measurements at room temperature.