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Fabrication and Characterization of n-ZnO Hexagonal Nanorods/p-Si Heterojunction Diodes: Temperature-Dependant Electrical Characteristics

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Abstract

This paper reports the temperature-dependant electrical characteristics of n-ZnO hexagonal nanorods/p-Si heterojunction diodes. The n-ZnO hexagonal nanorods were grown on p-Si substrate by a simple thermal evaporation process using metallic zinc powder in the presence of oxygen. The spectroscopic characterization revealed well-crystalline nanorods, quasi-aligned to the substrate and possessing hexagonal shape. The as-grown nanorods exhibited a strong near-band-edge emission with very weak deep-level emission in the room-temperature photoluminescence spectrum, confirming good optical properties. Furthermore, the electrical properties of as-grown ZnO nanorods were examined by fabricating n-ZnO/p-Si heterojunction assembly and the I-V characteristics of the fabricated heterojunction assembly were investigated at different temperatures. The fabricated n-ZnO/p-Si heterojunction diodes exhibited a turn-on voltage of similar to 5 V at different temperatures with a mean built-in-potential barrier of 1.12 eV. Moreover, the high values of quality factor obtained from I V analysis suggested a non-ideal behavior of Schottky junction.

Keywords

Author Keywords: n-ZnO Nanorods; Hexagonal Nanorods; p-Si; Structural Characterizations; Heterojunction Diodes

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