

Structural and optical properties of Sea-Urchin like ZnO structures grown on Si(100) substrate

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Single crystalline Sea-Urchin like ZnO structures were grown on the Si(100) substrate with a high density at the temperature ranges between 500–600 °C, by the rapid thermal chemical vapor deposition method, using the high purity metallic Zn powder and oxygen as a source material for Zn and oxygen, respectively. These structures consist of straight nanorods with the blunt faceted ends having the diameter of 30–60 nm. The full array of one sea-urchin like structure was about 4–5 μm. Detailed structural investigation using the high resolution transmission electron microscopy and selected area electron diffraction patterns confirmed that the as-grown structures are single crystalline with wurtzite hexagonal and mostly grown along the [0001] and preferentially oriented in the c-axis direction. The optical property of the product was studied by the photoluminescence spectroscopy at room temperature, shows a suppressed and weak UV emission and a broad green emission, indicating that the structures consists of some structural defects and oxygen vacancies.