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Morphological change of SnO₂ crystals formed through the thermal evaporation of a mixture of Sn and graphite powders in air

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Abstract

SnO₂ crystals with different morphologies were fabricated via simple thermal evaporation of a mixture of Sn and graphite powders at 1000°C in air at atmospheric pressure without any catalysts. When a mixture with a high weight ratio of graphite to Sn was used as source material, SnO₂ crystals with belt morphology were formed. The crystals had widths in the range of 2 ~ 5 μm, and lengths up to several hundred micrometers. As the weight ratio of graphite to Sn in source material decreased, SnO₂ nanoparticles with spherical morphology were synthesized. The nanoparticles had typical diameters of 100 ~ 300 nm. With further decreasing the weight ratio of graphite to Sn, the morphology of the SnO₂ crystals changed from particle to wire and rod. The diameters of the wire- and the rod-shaped crystals were in the range of 50 ~ 150 nm and 0.5 ~ 1.0 μm, respectively. The morphology of the SnO₂ crystals could be easily changed by adjusting the ratio of Sn and graphite in source material. This reveals that the ratio of graphite and Sn in source material is a critical factor to influences the morphology of SnO₂ crystals.

Keywords: SnO₂; Nanoparticles; Thermal evaporation; Morphological change; Semiconductors.

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