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Facile Synthesis of Nanocrystal Tin Oxide Hollow Microspheres by Microwave-assisted Spray Pyrolysis Method

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Tin oxide (SnO_2) hollow microspheres with narrow size distribution were prepared by a facile one-pot microwave-assisted spray pyrolysis method. The effect of temperature on microstructural and optical properties was investigated by X-ray diffraction (XRD), scanning electron microscope (SEM), high resolution transmission electron microscope (HRTEM), and UV-Vis spectrophotometer (UV-Vis), respectively. The SnO_2 particles obtained at and above 700 °C are tetragonal rutile structure with high purity and smooth surface morphology, which consist of well-interconnected SnO_2 nanocrystallines and the shell thickness was about 26 nm. UV-Vis absorption values were quite low in visible light region and high in ultraviolet region, indicating the possible utilization for optical purpose of the as-prepared SnO_2. The band gaps were 3.88 and 4.07 eV for SnO_2 synthesized at 700 and 800 °C, respectively. As compared to traditional electrical heating or flame modes, microwave heating introduced here demonstrates a high-efficiency, environmentally benign, and time- and energy-saving technology to synthesize advanced powders.