

High-Yield Synthesis and Properties of Symmetrical Comb-Like ZnO Nanostructures on Aluminum Foil Substrate

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Abstract:

Highly-symmetrical well-crystallized comb-like ZnO nanostructures were grown in a very large-quantity on the aluminum foil via non-catalytic thermal evaporation method by using metallic zinc powder in the presence of oxygen at low temperature of 440 °C. Detailed morphological investigations revealed that the as-grown combs are made with a ribbon-like stem and aligned nanorod/nanowire arrays attached uniformly and nicely along one side of the ribbon-like stem. The X-ray diffraction (XRD) pattern and high-resolution transmission electron microscopy (HRTEM) revealed that the as-grown nanocombs are crystalline and possessing a wurtzite hexagonal phase. The optical properties were observed by room-temperature photoluminescence (PL) and Raman-scattering which exhibited good optical properties for the as-grown products. A plausible growth mechanism has also been proposed for the formation of highly symmetrical comb-like ZnO nanostructures.

Journal of Nanoscience and Nanotechnology 10, 2, 1-8 (2010)