

Low Temperature Synthesis of Flower-Shaped CuO Nanostructures by Solution Process: Structural, Photocatalytic and XANES Studies

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Flower-shaped CuO nanostructures consist of triangular-shaped leaves, having sharpened tips with the wider bases, have been grown by the simple solution process at 100 °C using copper nitrate, NaOH, and hexamethylenetetramine (HMTA) for 3 h without the use of any complex reagents. Detailed structural observations exhibited that the flower shaped nanostructures are monodispersed in large quantity and exhibit the nanocrystalline nature with monoclinic structure. The flower-shaped morphologies are strongly dependent on the concentration of HMTA, presence or absence of NaOH and HMTA, and reaction time. In addition, the photocatalytic activity of the nanostructures was evaluated by examine the degradation of methylene blue. The photocatalytic property of the as-grown structures was probably due to the recycling of Cu^{1+} ion under light on the CuO interface and large surface area of the flower-like moieties. The XANES studies revealed that properties of as-synthesized products are closer to that of CuO, rather than those of Cu metal and Cu_2O .