

Interpenetrative growth of ZnO nanopushpin-like nanorods and acicular growth of nanorods by low temperature solution method on copper foil and silicon substrate

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An effective low cost solution method is demonstrated to grow ZnO nanopushpin-like nanorods on copper foil and high-density ZnO nanorods on silicon substrates at 70°C. FE-SEM analysis reveals that ZnO nanostructures grown on copper foil have diameter between 100–200 nm and 1 – 3 μm long. ZnO nanostructures grown on silicon substrate have diameter between 80 – 250 nm and 1 – 1.5 μm long. X-ray diffraction pattern (XRD) and Transmission electron microscopy (TEM) studies also showed that ZnO nanostructures are single crystalline with wurtzite hexagonal phase. ZnO nanostructures grown on copper foil exhibit transverse growth, which is responsible for formation of interpenetrative nanorods however nanostructures grown on silicon substrate shows acicular growth. It has been found that the growth of ZnO nanostructures is dependent on several parameters, such as the reaction time, initial concentration of reactants, reaction temperature, and surface of substrate.