

Synthesis of intensity visible photoemission ZnO nanoparticles for bio-medical applications

Sirikanjana Thongmee¹ and Jun Ding²

¹Department of Physics, Kasetsart University, 50 Ngamwongwan Road, Jatujak, Bangkok, 10900, Thailand

²Department of Materials Science & Engineering, National University of Singapore, 7 Engineering Drive 1, 117574, Singapore

Email: fscisjn@ku.ac.th

Abstract

ZnO nanoparticles have been studied for potential applications and ZnO is also known as a good photoluminescent semiconductor due to its ability of visible light emission. In this work, we have prepared ZnO nanoparticles by chemical routes. It has been found out that ZnO particles prepared using LiOH as bases can have visible emission of various colors, such as blue, green, cyan, and orange. The emission color of the ZnO nanoparticles can be tuned by adjusting the pH value of the precipitation solution and also by varying base concentration, it is good to control ZnO nanoparticles' emission property. In addition, XRD result corresponds well with the hexagonal ZnO structure and confirms the formation of ZnO crystals. The lattice parameters of the sample are $a = 3.28 \text{ \AA}$ and $c = 5.23 \text{ \AA}$. The results from TEM and UV-visible show that ZnO particle size plays an important role in emission light color and the visible emission is suggested to arise from electron transition from conduction band to a deep-trapped defect state. In order to obtain stable water-based colloid, hydrophobic ZnO nanoparticles were coated with silica via micro-emulsion process. Cell labeling has been successfully demonstrated.