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Chemical Synthesis of CdS Long Nanowire and CdS-Au Hybrid System

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Abstract: The synthesis and functionalization of semiconductor nanoparticles and noble metal has generated considerable interest for a variety of applications as biosensors, solar cell, and materials for optoelectronic devices. One of the key issues of nanoparticles is the improvement of synthesis procedure to control the particle size, shape and combine of between the different materials. The long CdS nanowire synthesized using high temperature (360 oC) decomposition method in the presence of trioctylphosphine oxide(TOPO;99%), oleic acid and oleylamine and we have succefully achived the growing gold(Au) nanoparticles onto the CdS nanowire at the room temperature using the procedure of Mokari et al1[1]. The synthesized long nanowires were characterized by x-ray diffractometer(XRD), transmission electron microscopy(TEM) and photoluminecence(PL) spectra. The nanowires with a diameter of around 5 nm were synthesized and they have not end point of length, so we cant measured the length of nanowire from TEM images. All the XRD peaks show characteristics of pure cubic phase zinc blend crystal structure and apparently broadened because of the nanoscale of nanowires. After gold nanocrystals are grown onto the nanowire surface, additional peaks appear in the XRD corresponding to the gold powder patterns. The photoluminecence spetra showes the sharp emission with a wel-defined peak around 450 nm due to the band gap of CdS semiconductors. We will step up the additional experimental and theoritical research for growing of Au nanoparticle onto the CdS naowire and it will help reveal the mechanism of hybrid system.

References:

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