E1 206

Preparation and characterization of size-controlled CdS and Cu2S nanocomposites with polyaniline

The study of small semiconductor particles has a long history, especially in the area of photovoltaics and photochemical conversion. One important feature, which distinguishes small semiconducting particles from bulk crystals, is their large specific surface area. There is a possibility of enhancing the separation efficiency of electrons and holes by controlling the chemical nature of the surfaces.

Composites consisting of a polymer matrix filled with nanosize semiconductor particles are interesting due to their unique electronic and optical properties which make them technologically important. Properties of these samples were found to depend on the size of the embedded particles.

In this study, the nanocomposite materials formed by cadmium suffide (CdS) and copper sulfide (Cu_2S)with polaniline (PANI) were snthesized by chemical methods. CdS/PANI and Cu_2S/PANI were prepared by incorporating Li_2S, $Cd(CF_3SO_3)_2$ and $Cu(CF_3SO_3)_2$ in PANI. Particle sizes for CdS and Cu2S were obtained by TEM and XRD. The results have shown that CdS and Cu_2S can be successfully incorporated into polyaniline matrix and their particle sizes can be varied by changing their concentration. These nanocomposites show good stability and high absorption in the visible spectrum. The juse of nanocrystals in photovoltaic devices allows great flexibility in controlling the performance of the devices by changing the nanocrystal size, concentration, and the material of the nanocrystals.