Abstract

This thesis focused on the preparation of gold, silver, zinc sulfide, and silver/zinc sulfide core-shell nanoparticles using chemical methods and their application in the solar cell. Gold nanoparticles were prepared at different sodium borohydride and cetyltrimethylammonium bromide concentrations. Silver nanoparticles were prepared using a reverse micelle method at different silver nitrate concentrations. Zinc sulfide nanoparticles were prepared at various molar ratios of zinc acetate dihydrate and at different temperatures. Silver/zinc sulfide core-shell nanoparticles were prepared using different quantity of our prepared silver nanoparticles. UV-visible spectra of all samples were explaining the effect of particle size on surface plasmon band position, which increase when the position shift toward higher wavelength (red-shift) and decrease when it shifted toward a lower wavelength (blue-shift). Transmission electron microscopy images confirmed the formation of the nanoparticles with spherical shape and some tringle and hexagon shapes in different sizes. Moreover, these results indicated that the zinc sulfide nanoparticles were surrounded by the silver nanoparticles by showing a color contrast implying the particle composed of different materials confirming the formation of silver/zinc sulfide core-shell. Average particle sizes were measured using dynamic light scattering. X-ray diffraction illustrates the crystallization nature of the nanoparticles, and crystal sizes were estimated using Scherrer's equation, which was changed with change conditions. The results of Fourier transform spectroscopy confirmed the chemical coordination between the nanoparticles obtained with the suitable functional groups of the capping materials molecules. Current-voltage measurements under illumination for polycrystalline silicon

solar cells deposited by gold, silver, zinc sulfide, and silver/zinc sulfide core-shell nanoparticles were studied. Cells deposited by the nanoparticles were found to provide enhanced photocurrent because the samples were investigated after a long time, and the samples were dried.