

Nanocomposites and nanomaterials

Optical properties of CdS: AuNPs nanocomposite

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The CdS/CdTe solar cell (SC) conversion efficiency has reached almost 21% [1]. Despite the progress, critical challenges remain for CdTe photovoltaics development perspectives, among them the enhancement of light capture.

The utilization of nanoparticles (NPs) is a way to enhance optical absorption in thin film solar cells. Application of gold NPs in CdS/CdTe SC is possible when surface plasmon fundamental absorption peak is localized within the SC spectral range (500–820 nm). Such conditions are satisfied by gold NPs of various dimension and geometry. The CdS semiconductor thin films with embedded arrays of gold NPs, i.e. CdS: AuNPs nanocomposites were fabricated. Methods of CdS films chemical deposition and gold NPs fabrication by thin film annealing were combined. Optical properties of the nanocomposites were studied. The position of plasmon absorption maxima and the optical band gap of CdS matrix were determined.

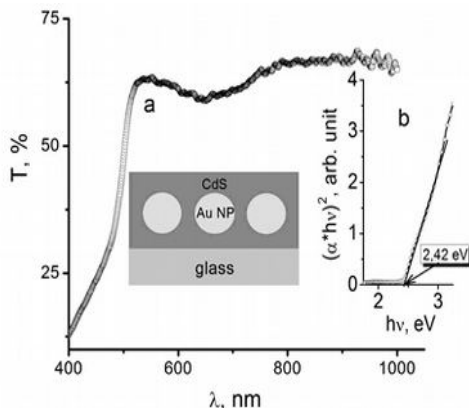


Fig. Optical transmission (a) and absorption spectra in plot $(\alpha hv)^2$ vs. $h\nu$ (b) of the CdS: Au NPs nanocomposite

1. Green M.A., Emery K., Hishikawa Y., Warta W., Dunlop E. Solar Cell Efficiency Tables (Version 45) // Progress in Photovoltaics: Research and Application. –2015. –23. –P. 1-9.