Iranian Journal of Physics Research, Vol. 23, No. 1, 2023
DOI: 10.47176/ijpr.23.1.81554

# Annealing temperature effect on optical properties of cadmium telluride thin films

**L Babazadeh Habashi[1], M Kamalian[1], M Gholizadeh Arashti[1], and E Hasani[2]**

1. Department of Physics, Yadegar-e-Imam Khomeini (RAH) Shahr-e-Rey Branch, Islamic Azad University, Tehran, Iran.
2. Department of Applied Physics, College of Medical and Applied Scinces, Charmo University, Chamchamal, Kurdistan Region,Iraq

E-Mail: l.babazadeh@iausr.ac.ir

(Received 18 August 2022 ; in final form 12 April 2023)

**Abstract**

Cadmium telluride nanoparticles (CdTe NPs) were deposited by the thermal evaporation method on glass substrates at a temperature of 373 K and a vacuum pressure of 2.7 mPa, and thin films with the thickness of 100 nm were fabricated. The prepared films were subjected to ultraviolet-visible (UV-Vis) spectroscopy to study the optical properties of thin films. To investigate the effect of annealing temperature on the optical properties of cadmium telluride thin films, these films were annealed at temperatures (323-373) K. The light absorption spectra of films before and after annealing were recorded using UV-Vis spectroscopy at a wavelength range of 600-1600 nm shows that the value of light absorption by films increased with the increased annealing temperature. The optical energy bandgap of the grown films has a decrement process from 1.519 eV after annealing. The results of the Tauc plot show the decrease in energy bandgap with annealing. Extinction and refractive indices increase with increment of photon energy and annealing temperature. The relative density and electronic polarizability of grown films increase after annealing. Other optical parameters obtained in this work, including the real and imaginary parts of the dielectric constant, increase, while the surface and volume energy loss functions decrease with increase of the annealing temperature. The results of this work indicate that the deposited cadmium telluride thin films annealed at 373 K have better optical properties for photoelectronic applications.

**Keywords:** cadmium telluride, thermal evaporation deposition, optical energy bandgap, extinction coefficient, electronic polarizability, dielectric constant

For full article, refer to the Persian section