Abstract

We investigate the effect of the hydrogen intentional incorporation on the structural properties of the amorphous gallium arsenide prepared by rf-magnetron sputtering technique. The properties of the non-hydrogenated films are: band gap of 1.4 eV (E04), Urbach energy of 110 meV, stoichiometric composition ([As]/[Ga] = 0.50), and dark conductivity of about 3.2 x 10^-5 (W.cm)^{-1}. Hydrogen was incorporated in the films by the introduction of an electronically controlled H2 flux during deposition, keeping constant the other deposition parameters. It was observed that small hydrogen incorporation produces a great change in the structural properties of the films. The main changes result from the formation of GaAs nanocrystals with mean sizes of about 7 nm into the amorphous network.

Keywords

Hydrogen; Gallium arsenide; RF-magnetron sputtering