Documents

Khan, Z.H.[a c] , Khan, S.A.[b] , Salah, N.[a] , Al-Ghamdi, A.A.[b] , Habib, S.[a]

Electrical properties of thin films of a-GaxTe100-x composed of nanoparticles

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[a] Center of Nanotechnology, King Abdul Aziz University, Jeddah 21589, Saudi Arabia
[b] Department of Physics, Faculty of Science, King Abdul Aziz University, Jeddah 21589, Saudi Arabia
[c] Department of Applied Sciences and Humanities, Faculty of Engineering Technology, Jamia Millia Islamia (Central University), New Delhi-110025, India

Abstract
Thin films of GaxTe100-x (x = 3, 6, 9 and 12) have been synthesized by thermal evaporation. From SEM images, it is observed that all the films contain nanoparticles of sizes varying from 100 to 200 nm. The dc electrical conductivity of the as-deposited films of GaxTe 100-x nanoparticles is measured as a function of temperature range from 298 to 383 K, and increases exponentially with temperature. The value of the activation energy, calculated from the slope of ln σdc versus 1000/T plots, is found to decrease with increase in the Ga content. On the basis of the value of the pre-exponential factor σo, it is suggested that the conduction is due to thermally assisted tunneling of carriers in localized states near the band edges. The optical measurements suggest an indirect optical band gap in this system. The value of the optical band gap decreases on increasing the Ga concentration. © 2011 Taylor & Francis.

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a-GaxTe100-x nanoparticles; activation energy; dc conductivity; optical band gap; SEM; TEM; thin films; XRD

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