

## Abstract

### **Elaboration and characterization structural, optical and electrical characterization of thin films of ZnTe/PVC and ZnSe/PVC nanocomposites.**

The objective of this work is to control the different parameters involved in the synthesis, by the hydrothermal method, of nanoparticles of ZnTe and ZnSe semiconductors in order to use them as a filler and incorporate them into a polymer matrix to manufacture thin films of hybrid nanocomposites (organic/inorganic). A great interest has recently been granted to composite materials and particularly to nanocomposite materials because they have very interesting properties which are the combination of the specific properties of each constituent phase of the nanocomposite. This characteristic opens the way to many practical applications. The initial phases used to manufacture our nanocomposites are the semiconductor nanoparticles ZnTe, ZnSe and the most common polymer: poly (vinyl chloride) (PVC). The structural, optical and electrical properties of the elaborated samples, in the form of thin films by the dip-coating technique, were highlighted by different characterization techniques: DRX, FT-IR, Raman, AFM, UV-Visible, Photoluminescence and measurement of electrical resistivity. The obtained results demonstrated the synthesis of ZnTe and ZnSe nanoparticles, a more or less uniform distribution of the semiconductor particles in the PVC polymer matrix with a certain texture of the crystallites along the pulling axis of the thin films. The optical transmittance decreases with the concentration of ZnTe or ZnSe in the PVC but the optical gap varies very little. The intensity of the photoluminescence bands, located in the violet and red regions, is influenced by the mutual interaction between the PVC matrix and the ZnTe or ZnSe nanoparticles which takes place through a transfer of electronic charges between both media through Foster's phenomenon. The samples of the studied nanocomposites show a very interesting optical activity; by this behavior these materials can claim applications in various fields such as optoelectronics and telecommunications. Electrical measurements using the four-point technique showed a strong reduction in electrical resistivity

**Keywords:** Hydrothermal synthesis, ZnTe, ZnSe, PVC, Nanocomposites, Thin films, Dip-coating, Structural and optical characterization, Photoluminescence, electrical resistivity.