

Polymer Nanocomposites for Electro-Optics: Perspectives on Processing Technologies, Material Characterization, and Future Application

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Abstract This review concentrates on semiconductors and carbon nanotubes as the inorganic component of organic–inorganic nanomaterials. One of the cornerstones of the current push towards future improvements in electronics and in optics technology is the decrease in size of the various components used for device manufacture. This paper discusses the character of nanocomposites for optics and electronics, their preparation, and the properties of semiconductor nanoparticles such as ZnS, ZnO, ZnS:Mn, TiO₂, CdSe, and CdS. Research in this area has shown the great potential advantages of novel materials composed of semiconductor nanocrystals and a polymer matrix. A short characterization of the nature of carbon-based materials (i.e., fullerenes and nanotubes) is given to provide a brief review of these materials. Then, the characterization of non-conjugated (PMMA, PS, and PVDF) and conjugated (PT, PVK, PPV, and PANI) polymer matrices and nanocomposites is described. Finally, the most advanced applications of the nanocomposites are presented.

Keywords Conjugated polymer · Fullerene · Nanocomposites · Nanocrystals · Nanotube · Non-conjugated · Polymer semiconductor

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