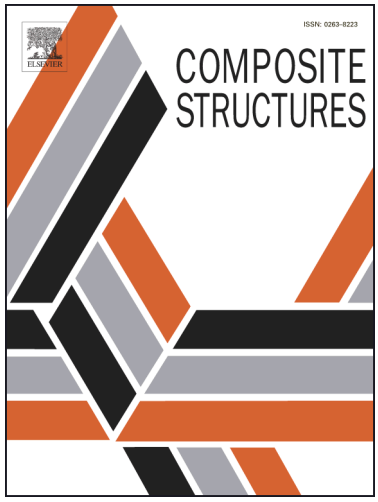

Optical energy band gap of PAAm-GO composites

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OPTICAL ENERGY BAND GAP OF PAAm-GO COMPOSITES

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Abstract.

Graphene oxide (GO) can be used as an electron acceptor for polymers. The generation of the exciton in such materials is intimately related to the optical band gap. Polyacrylamide (PAAm) – graphene oxide (GO) composites were prepared via free radical crosslinking copolymerization with GO content varying in the range between 5 and 40 µl of GO. The influence of the GO content on the optical properties of the composites is characterized by ultraviolet visible spectrophotometer. The optical band gap of the composite has been calculated by using Tauc's model. The tail width of the localized states has been calculated by using Urbach's relation, and the values of Urbach's energy with the variation of GO have been found from 2,89 to 2,96 eV. The results demonstrated that GO can be well dispersed in the PAAm-GO composites and consequently the optical band gap has been correlated with the various amounts of GO.

Key words: Polyacrylamide (PAAm), Graphene Oxide (GO), UV-vis spectrum, absorbance, energy band gap.

INTRODUCTION

The determination of band gap in materials is important in the semiconductor and nanomaterial industries [1]. Band gap indicates the difference in energy between the top of the valence band filled with electrons and the bottom of the conduction band devoid of electrons. The band gap energy of insulators is large (>4eV), but lower for semiconductors (<3eV)[2]. Optical properties and electronic structure of amorphous Germanium are obtained from photon energies between 0.08 and 1.6 eV [3]. The comparison of a theory with the experimental results leads to an estimate of the localization of the conduction band wavefunctions. Experimental evidence about the states in the gap of chalcogenide glasses is