

**Characterization of electrosynthesized conjugated polymer-carbon nanotube composite:
Optical nonlinearity and electrical property.**

ABSTRACT

The effects of multi-walled carbon nanotube (MWNT) concentration on the structural, optical and electrical properties of conjugated polymer-carbon nanotube composite are discussed. Multi-walled carbon nanotube-polypyrrole nanocomposites were synthesized by electrochemical polymerization of monomers in the presence of different amounts of MWNTs using sodium dodecylbenzenesulfonate (SDBS) as surfactant at room temperature and normal pressure. Field emission scanning electron microscopy (FESEM) indicates that the polymer is wrapped around the nanotubes. Measurement of the nonlinear refractive indices ($n(2)$) and the nonlinear absorption (β) of the samples with different MWNT concentrations measurements were performed by a single Z-scan method using continuous wave (CW) laser beam excitation wavelength of $\lambda = 532$ nm. The results show that both nonlinear optical parameters increased with increasing the concentration of MWNTs. The third order nonlinear susceptibilities were also calculated and found to follow the same trend as $n(2)$ and β . In addition, the conductivity of the composite film was found to increase rapidly with the increase in the MWNT concentration.

Keyword: Conducting polymers; Carbon nanotubes; Optical properties; Electrical characterization.