

EVALUATION OF OPTICAL CONSTANTS OF WIDE BAND GAP CADMIUM DOPED POLYPYRROLE

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ABSTRACT

Polypyrrole is a well known conducting polymer whose electrical properties have been studied deeply. Amongst the various ways of polymerizing Pyrrole chemical route was chosen for the present study. Ferric chloride was chosen as an oxidizing agent. Cadmium was found to be an appropriate dopant. Cadmium belongs to group IIB with atomic number 48 having electronic configuration [Kr] 4d¹⁰ 5s². An expected substitution of Cd with Nitrogen of Pyrrole would leave a single electron with Cd after bond formation. Thus, creating a probability of polaron and bipolaron band formation. The expected results are reflected in the absorption spectra of the samples with clearly visible broad free carrier tails after 500 nm. Characteristic peak around 350 nm to 450nm is observed in all the samples confirming the formation of polypyrrole. Band gap of samples are found in the range of 2.80 eV to 4.07 eV. Apart from this some of the important optical constant such as absorption coefficient, extinction coefficient, refractive index and optical conductivity have also been evaluated for all the samples and have been studied as a function of energy. SEM analysis reveals formation of highly spherical polypyrrole with high amount of porosity.

KEYWORDS: Absorption Coefficient, Extinction Coefficient, Refractive Index, Optical Conductivity, Dielectric Constant