

Electrical studies of PANI and PANI/CdSe nanocomposites for diode applicationsRashmi Singh¹, A. K. Bajpai² and A. K. Shrivastava¹¹ School of Studies in Physics, Jiwaji University Gwalior, 474011 India² Bose Memorial Research Lab, Dept. of Chemistry, Govt. Autonomous Science College Jabalpur, 482003 India. E-mail: rash.pinki@gmail.com

Abstract: The presence of semiconductor CdSe nanoparticles in polymer-semiconductor composite material enhanced its physical, electronic, optical and structural properties. Charge carriers in CdSe are quantum confined, when its size is less than bohr radius. This results an increase in its electrical response. Present work reports the synthesis of polyaniline (PANI) and PANI/CdSe composite through chemical oxidative polymerization method. The synthesized materials were characterized using XRD. XRD spectra indicate amorphous nature of pure PANI that further changes into semi crystalline nature when CdSe was added into the PANI matrix. XRD of PANI/CdSe nanocomposites show the presence of both the phases viz. cubic & hexagonal. Polyaniline behaves as p-type semiconductor whereas CdSe is an n-type semiconductor. I-V characteristics of PANI/CdSe nanocomposites show as if the composite is behaving like junction diode. The result show that when CdSe nanoparticles added into the PANI matrix, the value of current changes from 10^{-6} amp to 10^{-3} amp. DC conductivity of PANI/CdSe nanocomposites also observed to get enhanced from 10^{-5} Scm⁻¹ for pure PANI to 10^{-2} Scm⁻¹. The nature of DC conductivity resembles with that of organic-inorganic heterojunction diode. Moreover, PANI and PANI/CdSe nanocomposites can also be used in various applications such as solar cells, light emitting diodes, super capacitors, field effect transistor and junction diodes

References:

- [1] Patidar, D.; Jain, N.; Saxena, N. S.; Sharma, K.; Sharma, T. P., Brazilian Journal of Physics 2006, 36 (4A), 1210-1212.
- [2] Singh, N.; Singh, J.; Kumar, S.; Kumar, M.; Gaur, A.; Sirohi, K., Int. Jour. of Resear. In Appl. Nat. and Soc. Sci. 2013, 1(1), 9-12.