HIGH PRESSURE SPECTROSCOPIC STUDIES OF ORGANIC DEVICE MATERIALS

KESHAB RAJ PAUDEL

Dr. Meera Chandrasekhar and Dr. Suchi Guha, Dissertation Supervisor

ABSTRACT

A comparison of photoluminescence spectra of as-is and thermally cycled di-octyl substituted polyfluorene (PF8) under pressure has been used to disentangle inter- and intra-chain interactions. Raman study of this system shows a strong electron-phonon interaction between the Raman phonon and the electronic continuum.

Photoluminescence and phosphorescence studies of a ladder type poly(*para*-phenylene) (PhLPPP) under pressure have given for the first time an evidence that the singlet-triplet splitting remains almost a constant under enhanced intermolecular interaction. For polymer bulkheterojunctions of P3HT or PhLPPP with PCBM, the photoluminescence and absorption spectra reveal that the LUMO band-edge offset increases with pressure. Raman studies under pressure show that the molecular ordering is barely affected by pressure in the pristine P3HT, whereas the ordering decreases with pressure in PCBM blended P3HT beyond 3.0 GPa.