

Polarization Effects in Organic Spintronics, Solar Cells, and Thermoelectrics

Bin Hu

Department of Materials Science and Engineering
University of Tennessee, Knoxville, TN 37996, USA

Electrical polarization is an important parameter in controlling internal optic, electronic, optoelectronic, and spintronic processes in both linear and non-linear regimes in organic materials. In principle, electrical polarization can affect the electron-phonon coupling and ϵ - μ coupling, and consequently changes the transport behavior in electrical and thermal conduction, the charge dissociation and recombination in excited states, and the magneto-electronic properties in magnetic field effects. Therefore, using electrical polarization may present a new mechanism to control multiple functions in organic materials. This presentation will report (i) the new phenomenon in the family of magnetic field effects: magneto-dielectric functions in excited states, (ii) the new understanding on the dipole-dipole interactions at donor:acceptor interfaces in OPV devices, and (iii) new driving force to develop Seebeck effects in organic thin-film thermoelectric devices.