MAR15-2014-020285

Abstract for an Invited Paper
for the MAR15 Meeting of
the American Physical Society

Conductance and Thermopower in Thiophene and Oxidized Thiophene Single-Molecule Junctions

LATHA VENKATARAMAN, Columbia Univ

Organic electronic materials have impacted the development of semiconducting, photovoltaic and thermoelectric devices. The precise control afforded over molecular design by organic synthesis allows for device properties to be readily tailored facilitating varied functionality. Measuring charge transfer characteristics and thermoelectric properties in organic devices and across metal-organic interfaces is of critical importance for understanding structure-function relations and single molecule measurements offer an ideal test bed for such measurements. In this talk, I will review the scanning tunneling microscope break-junction technique used to measure conductance in single-molecule devices focusing on molecular systems that have strong potential for application in organic and photovoltaic devices. Specifically, I will discuss measurements of thiophene and oxidized thiophene oligomers and illustrate how structure and conformations impact both the electronic characteristics and the dominant charge carrier in these systems. I will end this talk discussing results with a new class of thiophene derivatives where the charge carriers are changed from holes to electrons as the length of the oligomer is increased. With these measurements, we illustrate a new means to tune p- and n-type transport in organic materials.