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Analysis of interface states in blend of polythiophene and polyselenophene: experiments and theory HELENE ANTAYA, MACIEJ SAKOWICZ, CARLOS SILVA, MICHEL COTE, University of Montreal — Organic photovoltaic devices are presently the subject of intense research since they could eventually propose solar energy solutions at a much reduced cost compared to inorganic devices. Presently, electron transport in organic photovoltaic devices is achieved with a fullerene derivative (PCBM) but this solution has some disadvantages. First, the ratio of PCBM to polymer has to be quite high to assume good electronic transport, and second, the relatively high cost of PCBM is not ideal with the goal to reduce the cost of the device. For these reasons, a replacement for PCBM is desirable and an all polymer device solution is viewed as the best avenue. Since polythiophene (P3HT) is ideal for hole transport, its isovalent polyselenophene (P3HS) where sulfur atoms are replaced with selenium atoms might offer an interesting alternative to PCBM. The physical processes in organic devices are quite different from those of inorganic devices. Charge separation in organic devices is achieved by forming an interface between two organic materials with type 2 level alignment. However, because of the large binging energies observed in organic compounds, there is often the presence of H-aggregate states at the junction between the two organic materials. In this presentation, we will report the results of interface states in a blend of polythiophene and polyselenophene. Photoluminescence spectra will be presented along with calculations of these states with the help of the time-dependent density-functional theory.

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