Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Experimental Determination of Charge/Neutral Branching Ratio in π-Conjugated Polymers by Broad-band Ultrafast Spectroscopy[1]
CHUANXIANG SHENG, MINGHONG TONG, SANJEEV SINGH, Z. VALY VARDENY, Physics Department, University of Utah, Salt Lake City, Utah 84112, USA
— We demonstrate a reliable method of determining the branching ratio, η of photogenerated charge (polarons) to neutral (excitons) photoexcitations in various π-conjugated polymer films and solutions using femtosecond ultrafast spectroscopy with broad spectral range from 0.14 to 2.7 eV. We found that both excitons and polarons are instantaneously photogenerated, but η critically depends on the film nanomorphology, which, in turn controls the interchain coupling. In films, η varies between 1% for derivatives of poly(p-phenylene vinylene) casted from chloroform solution, to more than 30% for regio-regular poly-3-hexyl thiophene. Our results show that charge photogeneration quantum efficiency in these materials is an interchain process; and this has ramifications for their use in solar cell applications.
[1]Supported in part by the DOE.

Chuanxiang Sheng
Physics Department, University of Utah, Salt Lake City, Utah 84112, USA

Date submitted: 15 Nov 2006 Electronic form version 1.4