Physikalisches Institut
Fakultät für Mathematik und Physik
Albert-Ludwigs-Universität Freiburg

QE

Quantum Efficiency Seminar und Colloquium

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Controlling Molecular Conformation and Morphology for Understanding Charge Transport in Conjugated Polymers

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By gaining a precise control over both molecular conformations and morphology, we aim to obtain a correlation between the order at macromolecular level and the excitonic and electronic transport properties of conjugated polymers. Here, we report on two methods that we use in order to obtain oriented morphologies of conjugated polymers: directed crystallization and induced dewetting.

Crystallization in dilute solutions leads to macroscopic single crystals which are free of grain boundaries and structural defects. The unique structure of single crystals over many lengthscales makes them ideal model systems for transport studies. The preparation and structural properties of Poly(3-hexylthiophene) single-crystals grown by employing a self-seeding approach, i.e. by circumventing the nucleation process, will be discussed.

Induced dewetting is used to control polymer conformations by stretching molecules within a thin residual layer in the dewetting direction. The degree of molecular stretching depends on the dewetting velocity. We show that, under nitrogen conditions, light intensity decelerates the dewetting velocity of a thin film of conjugated Poly[2-methoxy-5-((2'-ethylhexyl)oxy)-1,4-phenylenvinylene] (MEH-PPV) molecules embedded in an optically inert polystyrene matrix. This observation is suggesting that light induces new electronic states in MEH-PPV molecules leading to a change in molecular conformation characterized by higher chain rigidity.

Date: **Tuesday, December 13th, 2011 14:15 pm**
Location: **Lecture Hall 1, Hermann-Herder-Str. 3, Freiburg**

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