

Relation of Structure and Charge Transport in 'Single-Stack' Organic Nanowires

*Professor Holger Frauenrath
Institute of Materials, EPFL*

E-mail: holger.frauenrath@epfl.ch

Friday Apr 19, 16:00, Room MXC 315

Abstract: Organic nanowires may provide insights into the fundamental processes of charge generation and transport in organic semiconductors under nanoscopic confinement. Here, we demonstrate how a simple molecular design results in nanowires with defined lateral dimensions that comprised a single stack of tightly π – π stacked chromophores at their core. Moreover, we prepared well-defined microfibers that exhibited hierarchical structure formation with a remarkably high degree of internal order and enabled us to obtain detailed structural information on all length scales with molecular level precision. The nanowires and microfibers showed light-induced formation of radical cations that behaved like positive polaron charge carriers. The nanofibrils were semiconducting, showed space-charge injection-limited conductivity behavior, and exhibited photo-current generation, relating their macroscopic electric properties to the spectroscopically characterized charge carriers. Our results, thus, provide an example of a universal organic nanowire model system that successfully links molecular design, well-defined supramolecular structure formation, charge carrier generation, and finally macroscopic charge transport.