Polyamides Comprising π-Conjugated Segments

B. Özen[1], H. Frauenrath[1]*

[1]EPF Lausanne

Polymer semiconductors often feature varying degrees of structural order, which plays a key role in determining their macroscopic properties. Therefore, approaches to control the balance between short-range order and overall disorder are highly relevant, to develop a better understanding of charge carrier generation and transport and, especially, to design novel high-performance materials for organic electronics. To this end, our work aims to make use of hydrogen-bonded groups attached to π-conjugated chromophores to guide the supramolecular arrangement of the chromophores in the solid state, and the morphology of thin films processed from these materials.

Our previous investigations with quaterthiophene acetamide have shown that the presence of hydrogen-bonded functional groups reinforces structural elements required for efficient π-overlap. Now we intend to use this analogy and investigate novel semicrystalline polyamides comprising π-conjugated segments. Here we report on the three-step, gram scale synthesis of bithiophene dicarboxylic acid monomer. Seven polyamides with different diamine lengths were synthesized by solution-phase polycondensation using Yamazaki-Higashi conditions. The obtained polyamides were thermally characterized and investigated regarding their chemical and supramolecular structure.