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Bioinspired organic electronics with self-organizing organic semiconductor-peptide hybrids (extension)

Initiative: Integration molekularer Komponenten in funktionale makroskopische Systeme (beendet, nur noch Fortsetzungsanträge)

Bewilligung: 02.12.2013

Laufzeit: 3 Jahre

The controlled assembly of rod- and disk-like semiconducting organic S-systems such as peryleneimides (n-type, electron acceptor) and oligothiophenes (p-type, electron donor) is a key element to the development of organic electronic devices with tailor-made (opto)- electronic properties for functions ranging from field-effect transistors to solar cells. Peptidic scaffolds will be utilized to direct and control the supramolecular assembly properties of S-conjugated systems. By variations of the topology and rigidity of the peptide scaffold as well as the nature of the semiconducting moieties, the self-assembly properties of the hybrid materials is varied to develop and control nanostructured mesoscopic materials for use as components in macroscopic organic field effect transistors and bulk heterojunction organic solar cells. The synergy of the peptide scaffold and the semiconducting S-systems is envisioned to provide for optimal and tunable charge transport, (opto)electronic, and photovoltaic properties. Furthermore and in a final stage, the project aims to combine both, the n-type and the p-type assemblies, in ordered interdigitated heterojunctions providing a nanoscale phase separation, which is governed by the peptide backbone and leads to ideal interfaces for charge separation in organic solar cells.

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