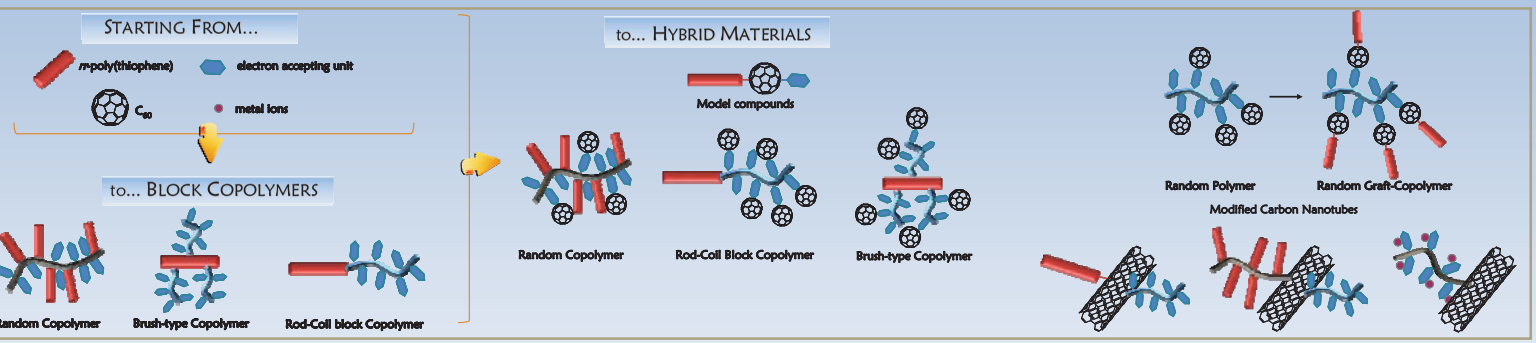
Design and Development of New Electron Acceptor Polymeric and Hybrid Materials & their Application in Organic Photovoltaics

"ARISTEIA" Action of the "Operational Programme Education and Lifelong Learning" co-funded by the European Social Fund (ESF) and National Resources

Objective

The main target of the DENEA project is the formation of new electron accepting materials and their combination with electron donor functionalities and or carbon allotropes, producing polymer as well as hybrid electron donor-acceptors. These can potentially be applied to plastic solar cells as the active layer or as compatibilizers and stabilizers of the typical polythiophene-PCBM blends.



Consortium

University of Patras - Chemistry Department (Co-ordinator): Prof. J. K. Kallitsis

University of Patras - Physics Department: Ass. Prof. G. Leftheriotis

Foundation for Research & Technology/Institute of Chemical Engineering Sciences (FORTH/ICE-HT): Dr. A. Siokou

Methodology

- Synthesis of Monomers & Small Molecules
- Homopolymers & Copolymers
- Hybrid Materials
- Physico-& Electro-chemical, Morphological Characterization
- PV Device Fabrication

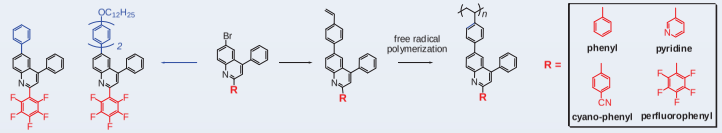
"the successful implementation of the project requires an interdisciplinary approach combining expertise from various scientific areas including organic and polymer chemistry, semiconductor physics and chemistry, thin film characterization and processing as well as device development which is assured by the collaboration of the distinguished faculty members of the DENEA project"

The specific targets of the project are:

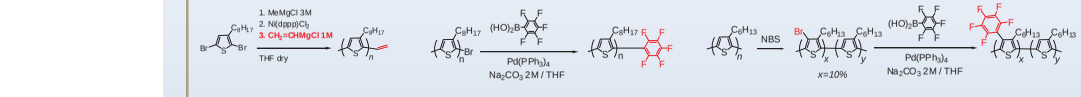
1) Employment of macromolecular engineering for the development of complex molecular, polymeric and copolymeric electron acceptors or electron donor-acceptor architectures.
2) Development and optimization of synthetic methodologies toward Hybrid Polymeric and Copolymeric Electron Donor-Acceptor materials based primarily onto carbon allotrope form, e.g. fullerenes and carbon nanotubes.
3) Detailed physicochemical, electrochemical and morphological characterization of all organic, polymeric and hybrid materials. The understanding of the structure–property relations and more specifically of semiconducting and morphological features of these macromolecular and hybrid libraries will provide a guide for the development of efficient polymeric semiconductors.
4) Application and testing in Organic Photovoltaic Devices of those materials meeting all key property requirements.

Results

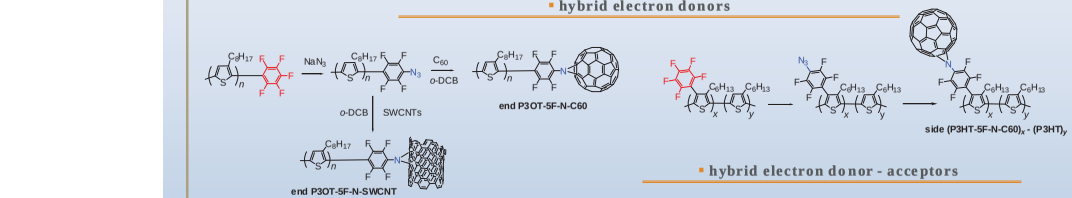
functional electron acceptors



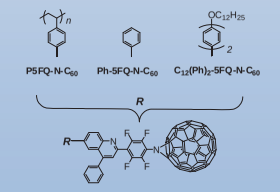
functional electron donors



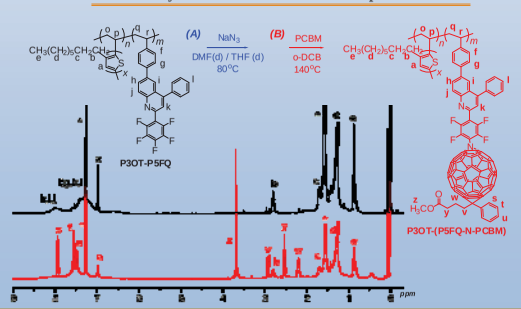
hybrid electron donors



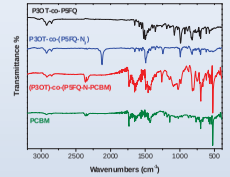
hybrid electron acceptors

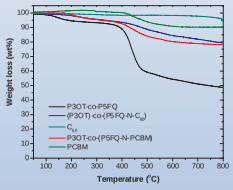


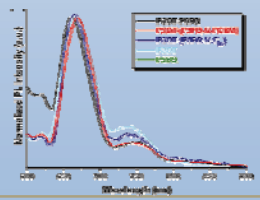
hybrid electron donor - acceptors

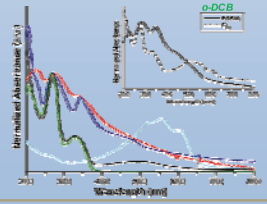


structure, optical characteristics

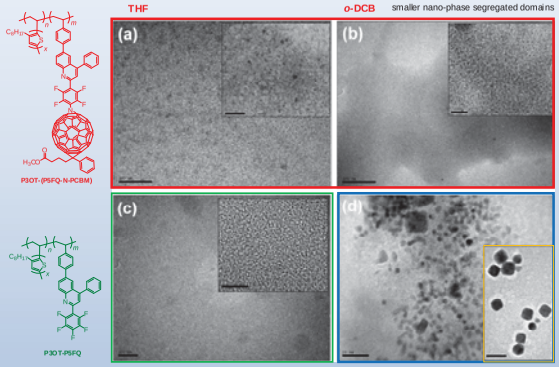


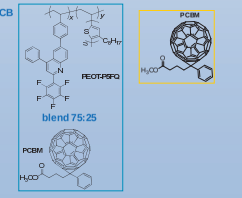






thin film morphology





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