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

DENEA

Project Objectives

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.

The project is divided into 5 technical work packages (WP2-6) and one work package devoted to the dissemination of the project activities to the open public (WP1).

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.

This is an interdisciplinary project 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.

Patents & Publications

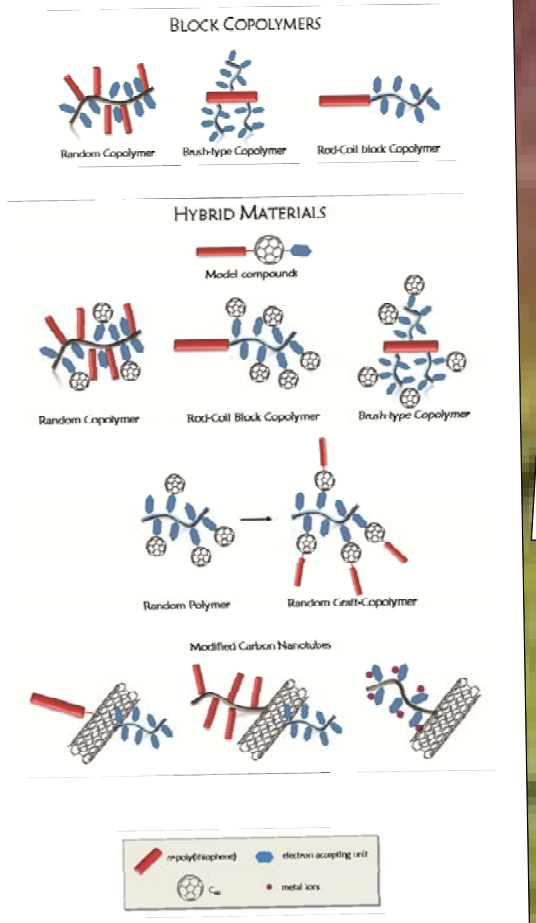
PATENT

"Development of New (Co)Polymeric and Hybrid (Co)Polymeric Electron Acceptors for Organic Photovoltaic Cell Applications" A.K. Andreopoulou, S. Kourkouli, A. Stefopoulos, A. Siokou, J. K. Kallitsis, European Patent Application EP13001446.7/20-3-2013.

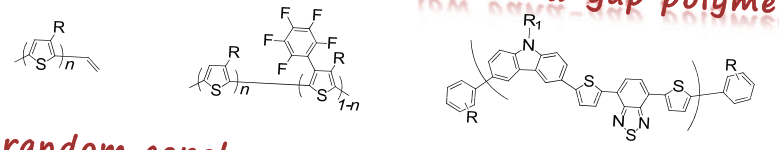
PAPERS

1. S. Kakogianni, S. N. Kourkouli, A. K. Andreopoulou, and J K. Kallitsis J. Mater. Chem. A, 2014, 2 (21), 8110 – 8117
2. J. K. Kallitsis, C. Anastasopoulos, A. K. Andreopoulou MRS Communications (2015) doi:10.1557/mrc.2015.42
3. S. Kakogianni, A. Ruff, G. Paloumbis, A. K. Andreopoulou, K Dirnberger, Sabine Ludwigs, J. K. Kallitsis to be submitted
4. L. Sygellou, S. Kakogianni, A. K. Andreopoulou2, K. Theodosiou, G. Leftheriotis, J. K.Kallitsis, A Siokou to be submitted

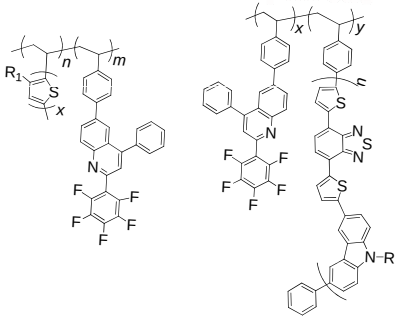
The DENEA project



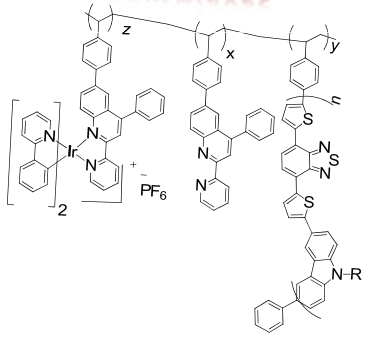
functionalized electron donors & low band-gap polymers



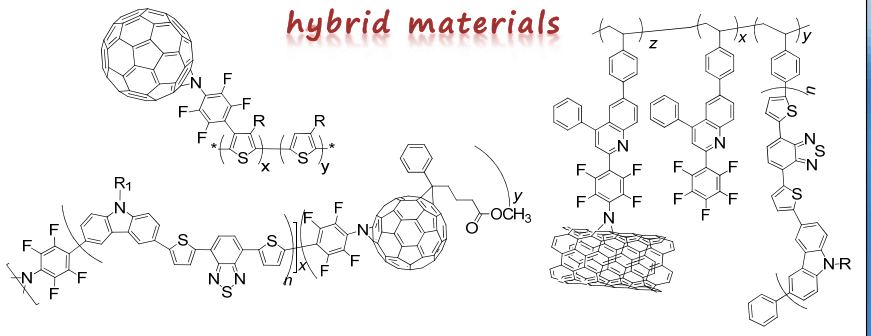
random copolymers



polymeric organometallic complexes



hybrid materials



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MANAGING AUTHORITY
NSRF 2007-2013
Co-financed by Greece and the European Union