

Abstract of Presentation

Presentation Title:

Thiophene-based Materials for Organic Solar Cells -
Photovoltaics of the third Generation

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Abstract :

Conjugated oligo- and polyheterocycles represent an important class of compounds in the field of organic materials and have successfully been used as active components in organic electronic devices, such as field effect transistors (FET) and logic circuits, light emitting diodes (LED) and full-colour displays, solar cells (OSC) or in molecular electronics. Their main advantage lies in their excellent charge transport properties which are a limiting prerequisite for most applications.

On the basis of oligothiophenes, we are currently synthesizing and investigating novel semiconducting architectures, structures and topologies. Applications of these novel materials in various types of organic solar cells have been realized.

3-Dimensional dendritic oligothiophenes up to a 4th generation containing and up to 90 thiophene units in a defined geometry have been synthesized and applied in solution-processed bulk-heterojunction solar cells giving promising results and valuable structure-property relationships. At the moment $\leq 2.5\%$ power conversion efficiency has been reached and we started to extend the absorption range of these materials to the red and NIR.

Novel low band gap oligothiophenes have been developed which were implemented in “small molecule” heterojunction solar cells to provide 3.4% efficiency and around 5% in first tandem cells constructed by vacuum technology.

Finally, we will present our approach to functionalized dendritic oligothiophenes which were implemented in dye-sensitized solar cells reaching 8.3% efficiency and high long term stability.

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