

Abstract of Presentation

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Note: This paper should be typed in “Times New Roman” of 12pt.

Presentation Title(Should be no more than 20 words):

Fast spectroscopy – Synthesis of functional molecules – Function in supramolecular structures

Abstract:

The full-organic solar cell concept is based on blends of two organic compounds one with donor-character, the other with acceptor properties. We approach the problem from a new direction in which intramolecular charge transfer is created with a 100% efficiency and for orienting molecules as a molecular films in order to achieve a vectorial electron transfer zone as the primary step in the consecutive processes following the light absorption.

The essential novelty of the invention, and that improving the efficiency, is that the primary excited photoactive molecules, containing the electron donating moiety, a porphyrin/phthalocyanine unit, and the electron accepting moiety, the fullerene unit, are oriented anisotropically in one direction so that the photoinduced electron transfer takes place always from the donor to the acceptor moiety. This phenomenon creates an intra-molecular, and simultaneously an intralayer potential, which then at the interface of another molecular layer forms a photovoltaic heterojunction supporting the electronic charge transport preferably in the same direction as the primary intramolecular charge transfer.

The efficiency of electron transfer can be increased by multilayer structures, where the solar cell is comprised of multiple subcells in series, each containing a charge-transfer dyad film (DA), all molecules oriented in the same direction, a light absorbing oligomer or polymer (LAP) layer adjacent to the donor moiety of the charge-transfer dyad, an electron transfer layer (ETL) adjacent to the acceptor moiety of the charge-transfer dyad and, as lowest of these layers, a hole transfer layer (HTL) adjacent to the light absorbing oligomer or polymer layer (LAP).

The long lifetime of the charge transfer state is one of the most promising property of the present cell systems: the longer the lifetime is the higher the efficiency of the cell.

The work is based strongly on time-resolved spectroscopy in organic solid films. The basic methods and results will be presented.