SIMULATION OF STATIONARY AND DYNAMIC RESPONSES OF ORGANIC SOLAR CELLS

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INTRODUCTION.

Organic photovoltaics have attracted much effort and many research groups during the past decade, because of low-cost and easy fabrication techniques. Despite the great progress that has been achieved in increasing the conversion efficiencies of the devices, there are still several problems to be solved to make the solar cells commercially viable, especially for cells based on bulk heterojunctions.

MATERIALS AND METHODS.

A two dimensional stationary and dynamic models of a bulk heterojunction cell were used to perform simulations of the stationary and dynamic responses of the organic solar cells [1]. The model implemented here simulate BHJ as two-dimensional domains using finite element software COMSOL Multiphysics. The model represents generation of free charge carriers via two-dimensional charge transfer (CT) states existing at the interface between donor and acceptor domains. Active layer of the OSC is treated as geometrically ordered ideally interpenetrating two- dimensional media consisting of donor and acceptor materials.

RESULTS AND CONCLUSIONS.

The model allowed distinguishing different regimes of the charge transport. It was shown that 2D time-dependent model can be applied to simulate transient photocurrent measurements in order to study sweep-out and recombination kinetics of the charges in the organic solar cells. The model can supply qualitative description of the transient processes in addition to the quantitative description of the simulated bulk heterojunction organic solar cells.

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REFERENCES.

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