
Modelling of Limitations of Bulk Heterojunction Architecture in Organic Solar Cells

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Polymer solar cells are considered as very promising candidates for development of photovoltaics of the future. They are cheap and easy to fabricate, however, up to now, they possess fundamental drawback - low effectiveness. One ask the question how fundamental this limitation is. We propose the simple model which examines the limitations of efficiency by analysis of geometrical aspects of the BHJ architecture. We calculate the effective area of the donor-acceptor border in the random mixture of donor and acceptor nanocrystals and further compare it with an ideal 'brush architecture'. It turns out that in the BHJ architecture, this effective areas are very close to the value obtained in the 'brush' architecture. Implications of this fact are discussed: we mention some other factors limiting the efficiency of BHJ architecture, try to estimate its scale and speculate on possibilities of realization of another architectures in the constructionn of solar cells.

Keywords: photovoltaics, photovoltaic panels, organic solar panels, BHJ, efficiency.