Photovoltaic properties of bulk heterojunction system containing glass forming indandione derivative with attached bulky groups

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The aim of the work is to evaluate possible use of 2-[[4-(bis(2-trityloxyethyl)amino)phenyl]methylene]indane-1,3-dione (DMABI-6Ph) as light absorbing material for solar cells. This class of materials was chosen based on our previous research of N,N'-dimetilaminobenziliden-1,3-indandione (DMABI) [1]. DMABI-6Ph is a perspective material due to its good photoelectrical, thermal and chemical properties. The main advantage of DMABI-6Ph is its ability to form amorphous films by wet-casting methods thus allowing using the compound in organic solar cells made from solution.

For now most popular materials for solution processable solar cells are polymer P3HT and fullerene derivative PCBM, but lot of investigations are in the field of new low molecular weight materials to replace the polymer.

Photoelectrical measurements were made to determine molecule ionization and electron affinity levels of DMABI-6Ph. Difference of 2.06 eV between DMABI-6Ph ionization level and PCBM affinity level was obtained. Accordingly open circuit voltage of system DMABI-6Ph:PCBM was measured up to 0.78V. The best power conversation efficiency was 0.11% for the DMABI-6Ph:PCBM mass fraction 2:1. Limiting factor for high efficiency could be low charge carrier mobility which can be increase by additional DMABI-6Ph modification.

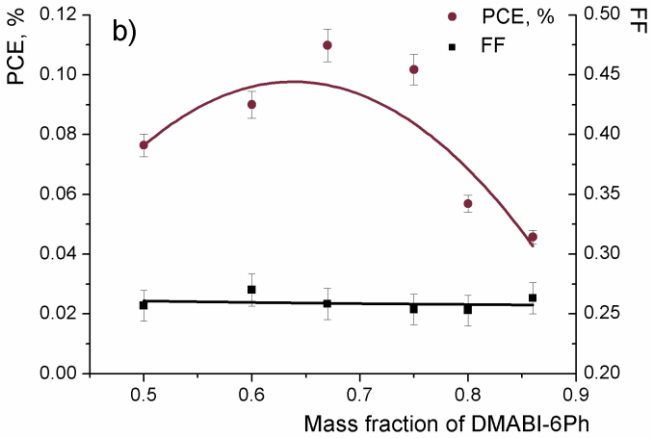

Fig.1 Solar cell photovoltaic characteristics- power conversation efficiency and fill factor- dependence on mass fraction of DMABI-6Ph in system DMABI-6Ph:PCBM.

References

1. V.Kampars et.al. , Proceedings of Riga Technical University. Material Science and Applied Chemistry J. Chem. Phys. **18**, 103 (2008)