

PHOTOVOLTAIC SOLAR CELLS BASED ON NANOCOMPOSITE OF CONJUGATED POLYMERS AND COMPLEXES FULLERENES WITH METALS

6-th year student
Gromchenko A.A.

Diploma thesis abstract

In this work for the first time complexes of fullerenes with metals (CFM) were investigated as a material for organic solar cells. We suppose that CFM as acceptor in polymer/fullerene solar cell could considerably increase its efficiency.

The drift electron mobility in films of CFM was obtained using the space-charge limited current (SCLC) technique. Also photoelectric properties of conjugated polymer/CFM solar cells were investigated.

The best electron mobility among studied CFM ($5 \times 10^{-4} \text{ cm}^2/\text{V}\cdot\text{s}$) was observed in films of the CFM IrC_{60} . This value allows one to use IrC_{60} in polymer/fullerene photovoltaic cells. However the mobility of other CFM appears to be very low (on the order of $10^{-5} \text{ cm}^2/\text{V}\cdot\text{s}$).

The photoelectric properties of photovoltaic cells based on conjugated polymers (MEH-PPV, P3HT) and CFM IrC_{60} , OsC_{60} , diIrC_{60} , OsC_{70} и diOsC_{70} were investigated. Solar cells based on [6,6]-phenyl C_{61} butyric acid methyl ester (PCBM) were used as reference samples. It was shown that efficiencies of solar cells based on CFM were considerably lower than efficiency of reference cell. However the open circuit voltage for P3HT/ IrC_{60} solar cell is 0.12 V higher than one of the reference cell P3HT/PCBM. The high value of the open circuit voltage shows the availability of CFM for further study to increase the polymer/fullerene solar cells efficiency.

Scientific adviser:

PhD, associate professor D. Yu. Paraschuk