HL 45: Joint Poster Session

Time: Tuesday 18:00–21:00 Location: P1

HL 45.1 Tue 18:00 P1

Investigation of the built-in voltage in organic pin solar cells using electroabsorption spectroscopy — •Ellen Siebert-Henze, Wolfgang Tress, Vadim G. Lyssenko, Susanne I. Hintschich, Karl Leo, and Moritz Riede — Institut für Angewandte Photophysik, Dresden, Deutschland

The built-in voltage of small molecule organic solar cells based on the pin concept is investigated. We use the method of electroabsorption spectroscopy whose principle is the detection of absorption changes due to electrical excitation (Stark effect). A voltage consisting of a DC and an AC part is applied to the sample and the change in absorption is detected using a lock-in amplifier. The variation of the applied DC voltage modifies the DC field across the sample leading to a linear change of the corresponding Stark signal. This supplies information about the built-in voltage of the device which is determined for different combinations of donor materials and hole transport materials (MeO-TPD, BPAPF, alpha-NPD, and ZnPc). In addition, the doping concentration of the hole transport layer is modified and the influence of the consequential change of the work function on the built-in voltage is examined. It is shown that both the short-circuit current as well as the fill factor increase for larger built-in voltages.

HL 45.2 Tue 18:00 P1

Bias stress analysis of P3HT organic Field-effect transistors — •Hippolyte Hirwa and Veit Wagner — School of Engineering, Jacobs University Bremen, Campus Ring 1, D-28759 Bremen, Germany

Understanding and minimizing potentially existing bias stress behavior of organic field effect transistors (OFETs) is crucial for reliable operations of devices. Existing considerable bias stress, i.e. current change upon prolonged operation time, can render otherwise promising approaches useless for real applications. In this contribution we analyze the bias stress in poly (3-hexylthiophen) (P3HT) based field effect transistors. The drain current decay under bias stress can be seen as a change of the total resistance of the device with time. This resistance change is a combination of the contact resistance change and the channel resistance change. The channel resistance channel change is a result of the threshold voltage change and a change of the mobility value. The contact resistance change and the threshold voltage change interpreted as caused by the trapping of carriers into trap levels in both the contact and the channel regions. Encapsulated P3HT layers have been proven to be stable for short time bias stressing but on longer time scales and depending on the environment bias stress effects are evident.

HL 45.3 Tue 18:00 P1

Photoinduced absorption spectroscopy of poly(3-hexylthiophene):fullerene solar cells — •Ralph Huber, Elizabeth von Hauff, and Jürgen Parisi — University of Oldenburg, Department of Physics, Energy and Semiconductor Research Laboratory, Carl-von-Ossietzky Str. 9-11, 26129 Oldenburg, Germany

Photoinduced absorption (PIA) spectroscopy is a versatile tool in the study of excited states in organic thin films and devices. PIA is a pump-probe method which uses a modulated or pulsed light beam of a specific wavelength to excite the semiconductor (pump beam). Via a white light source the sample is illuminated additionally to measure its absorption in a reflective or transmittive manner (probe beam). The change in absorption for different wavelengths can be used to identify excited states like excitons or free charge carriers.

In this study we employed steady state PIA to investigate poly(3-hexylthiophene):fullerene organic solar cells. The results of PIA measurements on the solar cells is presented.

HL 45.4 Tue 18:00 P1

Lock-In Thermography Investigation of Polymer Solar Cells and Modules — •Maik Bärenklau, Roland Rösch, Burhan Muhsin, Marco Seeland, Gerhard Gobsch, and Harald Hoppe — Institute of Physics, Ilmenau University of Technology, Ilmenau, Germany

Since polymer-fullerene solar cells and modules are typically designed in a multilayer architecture, local defects such as shunts and short-circuits in the device can cause the breakdown of the whole cell or module. Further more, highly resistive series connection can be a major cause for efficiency loss in solar modules. For screening and characterization of such processing imperfections, we apply lock-in thermography (LIT), a highly sensitive thermographic imaging method. We show that LIT is a useful tool for non-destructive qualitity control of large area polymer solar cells and modules that allows detection of local defects with high heat dissipation and also to test the quality of encapsulation.

HL 45.5 Tue 18:00 P1

Electric field induced exciton and charge transfer dissociation — •Sebastian Schwab[1], Julia Kern[1], Carsten Deibel[1], and Vladimir Dyakonov[1,2] — [1]Experimental Physics VI, Faculty of Physics and Astronomy, Julius-Maximilians-University of Würzburg, D-97074 Würzburg — [2]ZAE Bayern, Div. Functional Materials for Energy Technology, D-97074 Würzburg

The enormous potential of organic opto–electronic devices such as organic light emitting diodes and solar cells is still limited due to a lack of understanding of underlying processes and energetics. A deeper comprehension of the processes governing exciton and charge transfer dissociation as well as the parameters influencing them is crucial to reduce existing uncertainties. Therefore we studied the field induced quenching of photoluminescence of various materials such as MDMO–PPV. An applied electric field dissociates the singlet respectively charge transfer excitons, generated by laser illumination, into electron–hole pairs which corresponds to a reduction of radiative recombination and therefore of photoluminescence signal. We discussed our experimental results in view of the Braun–Onsager–Model of electric field assisted dissociation.

HL 45.6 Tue 18:00 P1

Enhancement of the photocurrent in Diindenoperylene based organic photovoltaic cells — •A. Steindamm[1], A.K. Topczak[1], A. Riecke[1], and J. Pflaum[1,2] — [1]Inst. Exp. Phys. VI, Würzburg University, 97074 Würzburg — [2]ZAE Bayern, 97074 Würzburg

The organic semiconductor Diindenoperylene (DIP) has shown its good potential as donor material for highly efficient organic photovoltaic cells (OPVCs). In combination with C_{60} as acceptor high open circuit voltages (V_{OC}) of 0.9 eV and a high fill factor above 70 percent have been observed. The latter can be explained by the high crystallinity of DIP thin films leading to exciton diffusion lengths of up to 100 nm [1], resulting in a high charge collection efficiency. One challenge in DIP based OPVCs is the comparably low photocurrent, which is mainly caused by rather poor light absorption due to the upright stacking of DIP molecules and the related transition dipole orientation perpendicular to the electric field vector of incoming light. Therefore we addressed the enhancement of the photocurrent in DIP/C_{60} cells by various approaches: First, we performed studies on excitonic transport by photoluminescence (PL)-quenching. Second, different exciton blocking layers (EBL) like Batho-Phenanthroline (BPhen) or 1,4,5,8-Naphthalene-Tetracaboxylic Acid Dianhydride (NDTCA) were employed for minimizing the recombination losses at the organic-metal interface. Finally, metallic nanostructures were implemented for improving the light absorption of DIP. Financial support by DFG (project PF385/4) is gratefully acknowledged.

[1] D. Kurrle and J. Pflaum, Appl. Phys. Lett. 92 (2008) 133306

HL 45.7 Tue 18:00 P1

Characterization Of Pentacene-Based Organic Field-Effect Transistors With SAM-Functionalized Gates — •Nis Hauke Hansen[1], Sebastian Röding[1], and Jens Pflaum[1,2] — [1]Inst. Exp. Phys. VI, Julius-Maximilians-University, 97074 Würzburg — [2]ZAE Bayern, 97074 Würzburg

In order to design low-voltage organic thin film transistors, ultrathin self-assembled monolayer (SAM) gate dielectrics have been proven of promising technological potential [1]. Alkylphosphor-SAMs chemically bound on aluminumoxide allow for high capacitances in combination with superior insulation characteristics. In this contribution we discuss the influence of SAM gate dielectrics on the growth and the performance of pentacene (PEN) thin film transistors (TFTs). Current-voltage (IV) measurements of vacuum deposited PEN TFTs have been performed showing high mobilities and low operating voltages. The structural properties of the films are determined by x-ray diffraction (XRD) and atomic force microscopy (AFM). The SAM thickness and surface roughness have been analysed by x-ray reflectivity (XRR) and multidimensional modeling by the Parratt-algorithm. Combining this data we develop a correlation between the roughness of the substrate and the structural and electrical PEN properties. In addition, by temperature dependent measurements we determine the dominant transport mechanisms in PEN TFTs at different temperature ranges. Financial support by BMBF (project GREKOS) is gratefully acknowledged.

[1] H. Klauk, et al., Nature 445 (2007) 745

HL 45.8 Tue 18:00 P1

Temperature dependent studies of the recombination process in organic bilayer solar cells — •Thiemo Gerbich[1], Alexander Foertig[1], David Cheyns[2], Paul Heremans[2], Carsten Deibel[1], and Vladimir Dyakonov[1,3] — [1]Experimental Physics VI, Physical Institute, Julius-Maximilians-University of Würzburg, Am Hubland, D-97074 Würzburg — [2]IMEC v.z.w., Kapeldreef 75, 3001 Leuven, Belgium — [3]Bavarian Centre for Applied Energy Research (ZAE Bayern e.V.), Am Hubland, D-97074 Würzburg, Germany

In spite of organic solar cells having reached more than 8 % power conversion efficiencies recently, fundamental processes such as the recombination dynamics are still not fully understood. Therefore we investigated evaporated copper phthalocyanine (CuPC):C60 bilayer devices with a well defined donor-acceptor interface. The technique of Transient Photovoltage (TPV) and Photocurrent (TPC) was used to study the recombination dynamics in dependence of temperature and active layer thickness. We found recombination orders higher than two, and discuss the relevant fundamental contributions of internal processes.

HL 45.9 Tue 18:00 P1

Theoretical investigations of the optical properties of (Mn-, Fe-, Co-, Ni-, Cu-, Zn-) phthalocyanines — •Davoud Pouladsaz and Michael Schreiber — Institut für Physik, Technische Universität Chemnitz

Phthalocyanines have attracted considerable attention due to their wide range of applications that stem from their electronic, optical, and structural properties. The optical properties of metal-phthalocyanine complexes are determined by the energetics of the frontier orbitals and their dependence on the deformation in the relaxed excited state. In the present work, the geometry of (Mn-, Fe-, Co-, Ni-, Cu-, Zn-) phthalocyanines has been optimized with density functional methods and the deformation in the relaxed excited geometries has been obtained from time-dependent density functional theory, which leads us to calculate the PL gap and the PL lineshape of each molecule. From randomized starting geometries and stability analysis including the calculation of vibrational modes, it was found that the minimum of the potential energy surfaces of the excited state of each molecule is also in D_{4h} geometry. We considered the Franck-Condon principle for calculating the couplings between electronic excitations and internal vibrations of each molecule.

HL 45.10 Tue 18:00 P1

Optical properties of pentacene layers on zinc oxide — •Jonatan Helzel, Stephanie Jankowski, Mira El Helou, Gregor Witte, and Wolfram Heimbrodt — Philipps Universität Marburg; Department of Physics and Material Sciences Centre Germany

In comparison to other organic semiconductor pentacene has a high carrier mobility. Pentacene is one of the most promising organic semiconductors for semiconducting devices. Like many other organic semiconductors pentacene is a p-type semiconductor, hence for electronic components as e.g. diodes, an n-type semiconductor is needed. We prepared the p-pentacen films with various thicknesses on n-ZnO substrates by molecular beam deposition. Optical spectroscopy was used to study the properties of these hybrid systems. The samples have been characterized by means of absorption and photoluminescence. The HOMO-LUMO transition as well as the excitonic states have been measured in the temperature range between 10 K and room temperature. At low temperatures a thickness dependent shift was observed for the two Davydov components of the pentacene exciton. Furthermore the exciton binding energies exhibit a thickness and temperature dependence. The reason of this unique behaviour will be discussed. Pentacene and ZnO have very different thermal expansion coefficients. This leads most likely to a tensioning of the thin films and a relaxation for the upper part of the thicker films. Due to the anisotropic expansion of pentacene not only the lattice constants, but also the angle between the molecules changes, while cooling them down.

HL 45.11 Tue 18:00 P1

Single Molecule Current Sensors — •Maximilian Nothaft[1], Steffen Höhla[2], Fedor Jelezko[1], Jens Pflaum[3], and Jörg Wrachtrup[1] — [1]3. Phys. Institut, Univ. Stuttgart, 70550 Stuttgart — [2]Char of Display Technology, Univ. Stuttgart, 70550 Stuttgart — [3]Exp. Phys. VI, Univ. Würzburg and ZAE Bayern, 97074 Würzburg

In this study we present our results on nanometer scale current sensing using photoluminescence quenching of single fluorescent dye molecules. From the quenching degree and internal molecular rate parameters it is possible to calculate the recombination rate and current density within the respective molecular capture radius. One striking aspect of this approach is the feasibility to optically measure the current dynamics by investigating photon correlation properties (FCS) of emitted photons.

Alterations in these properties can be directly related to time-dependent charge carrier densities. Therefore, this method enables a non-invasive determination of current densities in OLED devices at nm spatial resolution under operation.

As an example single Dibenzoterrylene dye molecules were dispersed in an OLED consisting of Poly(phenylene vinylene) (PPV) as host material. Besides determination of current density values, its spatial heterogeneity will be discussed. Additionally, a detailed analysis of current sensing sensitivity will be presented, discussing the resolution, its dependencies on internal molecular rate parameters and possible routes to further improve the measurement process.

HL 45.12 Tue 18:00 P1

Structural properties of thin films of organic charge transfer complexes — •Diana Nanova[1], Sebastian Beck[1], Milan Alt[1], and Michael Kröger[2,3] — [1]Kirchhoff-Institut für Physik, Universität Heidelberg — [2]InnovationLab GmbH, Heidelberg — [3]Institut für Hochfrequenztechnik, TU Braunschweig

Charge transfer (CT) complexes in the presented context are a mixture of two different types of molecules, one with electron accepting properties and one acting as a donor, which induces a charge transfer between the molecules. The band gap as well as the electronic and optical properties of the CT- compound depends on the degree of charge transfer. Mixing two CT-complexes at different concentrations by substituting only the acceptor molecules, might allow adjustment of the band gap and the optical properties in analogy to inorganic III-V semiconductor compounds. These materials could be applied in organic field-effect transistors or organic photovoltaic cells. Due to the importance of thin film deposition techniques for organic electronic devices we studied the growth of CT-compounds, like tetrathiafulvalene, tetracyanquinodimethane and its derivatives by thermal evaporation. The morphology of the films was investigated with atomic force microscopy and X-Ray diffraction on different substrates. To gain information about the electronic structure, we used ultra violet photoelectron spectroscopy and inverse photoelectron spectroscopy. We determined the degree of charge transfer in the complexes with infrared-spectroscopy using the linear relationship between the shift in the excitation energy of the C-N- stretching mode of the acceptor and the charge transfer.

HL 45.13 Tue 18:00 P1

Influence of silanization process on stability of solution processed bottom contact transistors — •Teodor Toader, Claudia Bock, and Ulrich Kunze — Werkstoffe und Nanoelektronik, Ruhr-Universität Bochum, Germany

In this work the influence of the silanization on the stability of solution-processed bottom-contact pentacene transistors using 13,6-N-Sulfinylacetamidopentacene (NSFAAP) [1] as precursor was investigated. The oxide of the devices is modified by trimethylchlorsilane (TMCS). Samples with an untreated oxide act as reference. The devices are stored under dark ambient conditions and nitrogen atmosphere, respectively. A clearly improved transistor performance of the TMCS-treated devices is found. A thirty times smaller sheet resistance of the treated transistors indicates an improved homogeneity of the film and is responsible for the superior device parameters. For transistors stored under dark ambient atmosphere the field-effect mobility decreased within 552 hours by 80% and 70% for untreated and treated transistors, respectively. The degradation of transistors stored under dark nitrogen atmosphere is considerable reduced (25% within 552 hours). The shift of the threshold voltage vs. time demonstrates that the absorption of H_2O on the pentacene layer is the main reason for the reduced stability of devices stored under ambient conditions.

[1] Ali Afzali, *et al.*, J. Am. Chem. Soc. **124** (30), 8812 -8813, (2002).

HL 45.14 Tue 18:00 P1

Time resolved Spectroscopy on different organic polymer/fullerene blends — •Berthold Jaeck[1], Bjoern Gieseking[1], Carsten Deibel[1], and Vladimir Dyakonov[1,2] — [1]Experimentelle Physik VI, Julius-Maximilians-Universitaet Wuerzburg, D-97074 Wuerzburg — [2]ZAE Bayern, Div. Functional Materials for Energy Technology, D-97074 Wuerzburg

One main topic for highly efficient organic bulk-heterojunction solar cells is a better understanding of the fundamental physical processes after photo-excitation and hence the optimization of the device design. Many of these processes, e.g. the interfacial charge transfer dynamics and the free charge carrier generation, are occuring on very short time scales in the sub-picosecond regime. Therefore time resolved spectroscopic techniques are of crucial importance.

Using femtosecond transient absorption spectroscopy we investigated the exciton and free charge carrier dynamics of poly(3-hexylthiophene), P3HT and poly[2,3-(4,4-bis-(2-ethylhexyl)-4H-cyclopenta[2,1-b;3,4-b']dithiophene)-alt-4,7-(2,1,3-benzothiadiazole)], PCPDTBT blended with diverse fullerene derivatives. Additionally, picosecond time resolved photoluminescence measurements were carried out, probing radiative decay paths so that a complete picture of these intial processes could be reached. Furthermore, the influences of structural and energetic disorder on these dynamics were examined.

HL 45.15 Tue 18:00 P1

Spectrally Resolved Transient Absorption in Polymer:Fullerene Blend Films — •Andreas Kämpgen[1], Julien Gorenflot[1], Carsten Deibel[1], and Vladimir Dyakonov[1,2] — [1]Experimental Physics VI, Julius-Maximilians-University Würzburg, 97074 Würzburg, Germany — [2]Bavarian Centre for Applied Energy Research (ZAE Bayern), 97074 Würzburg, Germany

Bimolecular charge carrier recombination is an efficiency limiting mechanism in organic solar cells. As this fundamental loss process is strongly related to the nanomorphology in blend films of electron donating and electron accepting materials, the study of this mechanism allows to draw conclusions about the impact of spatial (dis)order and phase separation on cell performance. The bimolecular recombination dynamics were investigated by nanosecond transient absorption spectroscopy. Measurements were carried out on blend films of polymers and fullerene derivatives in the temperature range from 30K to 300K. In order to distinguish between different excited species, different probe beam wavelengths were used. The decays were monitored on nanosecond to microsecond timescale and interpreted in terms of morphological as well as energetic trapping of charges.

HL 45.16 Tue 18:00 P1

Structural analysis of homoepitaxial grown surface structures on rubrene single crystals — •T. Schmeiler[1], R. J. Stöhr[2], J. Wrachtrup[2], and J. Pflaum[1,3] — [1]Inst. Exp. Phys. VI,Julius-Maximilians-Universtiy,97074 Würzburg — [2]3rd Phys. Inst.,Stuttgart University,70550 Stuttgart — [3]ZAE Bayern,97074 Würzburg

Self-assembled pyramidal surface structures on 5,6,11,12-tetraphenyltetracen (rubrene) single crystals offer an interesting approach to study exciton transport under spatial confinement [1]. These structures grown by physical vapor deposition could be applicable as organic micro-resonators and e.g. be coupled to single photon sources. Therefore an understanding of structural formation is inevitable. We have used smooth rubrene single crystals as substrates and analyzed the nucleation and growth behavior of homoepitaxially grown rubrene thin films deposited on-top by sublimation in high vacuum. We display different growth phases as a function of substrate temperature T and deposition rate R. Choosing R= 0.25 Å/s a pronounced island growth was observed. In order to establish a relation between the pyramidal structures and the islands, their evolution was investigated at constant T and R for various film thicknesses. The surface topography was determined by AFM measurements and subsequently analyzed by Fourier transformation. We show a straight connection between the initial islands and the macroscopic pyramidal structures enabling the controlled growth of rubrene structures for opto-electronic applications. Financial support by the DFG (project PF385/4) is gratefully acknowledged.[1] R. Stoehr et al., Appl. Phys. Lett. 96 (2010) 231902

HL 45.17 Tue 18:00 P1

Photoconductive AFM-Measurements to prove the Meyer-Neldel Rule in C_{60} films — •Astrid Wachauer[1], Igor Beinik[1], Markus Kratzer[1], Mujeeb Ullah[2], Helmut Sitter[2], Andrey Kadashchuk[3], and Christian Teichert[1] — [1]Institute of Physics, University of Leoben, Franz Josef Straße 18, A-8700 Leoben, Austria — [2]Institute of Semiconductor and Solid State Physics, Johannes Kepler University of Linz, A-4040 Linz, Austria — [3]Institute of Physics, National Academy of Science of Ukraine, Prospect Nauky 46, 03028 Kyiv, Ukraine

The Meyer-Neldel rule (MNR) provides a link between the activation energy and the pre-exponential factor of a thermally activated process (e.g. electrical transport in organic semiconductors). Recently, it has been demonstrated that the MNR for the temperature dependences of the charge carrier mobility is fulfilled upon varying the charge carrier concentration in organic semiconductors [1]. In this study, we applied Photoconductive Atomic Force Microscopy (PC-AFM) in order to investigate the temperature dependence of the photocurrent in C_{60} thin films under different degrees of illumination. The films were grown on ITO by Hot Wall Epitaxy and measured with PC-AFM in inert atmosphere. The charge carrier concentration was modulated by varying the intensity of the Xe 150W light source. Besides verifying the MNR, we observed a variation in the conductivity of the crystalline C_{60} including almost nonconductive grains. Supported by Austrian Science Fund (FWF) NFN projects S9706-N20, S9707-N20 and P19636.
[1]M. Ullah, et al., Appl. Phys. Lett. 96, 213306 (2010).

HL 45.18 Tue 18:00 P1

Investigation of ZnO interlayer and different substrates for dye-sensitized ZnO/polymer hybrid solar cells — •Julia Waltermann[1], Kay-Michael Günther[1], Stefan Kontermann[2], and Wolfgang Schade[2] — [1]Clausthal University of Technology, EFZN, EnergieCampus, Am Stollen 19, 38640 Goslar — [2]Fraunhofer Heinrich-Hertz-Institute, EnergieCampus, Am Stollen 19, 38640 Goslar

Dye-sensitized solar cells composed of an n-doped ZnO nanowire array and a p-doped polymer layer appears to be a promising candidate for low-cost production of environment-friendly solar cells. Earlier investigations on hybrid devices consisting of a transparent conducting oxide (TCO) substrate, ZnO-nanowires, a ruthenium dye (N719) and a PEDOT:PSS or P3HT layer have exposed that in our setup an additional polycrystalline ZnO layer beneath the ZnO nanowires is needed. It prevents short circuits caused by polymer seeping between the nanowires towards the counter electrode. To find the best combination of substrate material and ZnO deposition technique in this work three different TCO substrates: ITO, FTO or aluminium doped zinc oxide (ZnO:Al) are combined with ZnO layers prepared either by sputtering or by a sol-gel method. The samples are compared regarding surface topography, resistivity and possible build-up Schottky barriers.

HL 45.19 Tue 18:00 P1

ITO-free inverted polymer-fullerene bulk-heterojunction solar cells with different contact configurations — •Sebastian Wilken, Holger Borchert, Elizabeth von Hauff, and Jürgen Parisi — University of Oldenburg, Department of Physics, Energy and Semiconductor Research Laboratory, Carl-von-Ossietzky-Str. 9-11, 26129 Oldenburg, Germany

In order to replace the expensive indium-tin oxide (ITO), commonly used as transparent electrode in organic solar cells, we studied P3HT:PCBM bulk-heterojunction solar cells with an inverted layer sequence. Different concepts were used to obtain both a transparent and a highly conductive anode, e.g. ultra-thin gold layers (∼10 nm) or polymers like PEDOT:PSS in combination with metal grids. We performed transmittance and sheet resistance measurements for various layer thicknesses to acheive a compromise between high transmission in the absorption range of P3HT and good electrical conductivity. Furthermore the impact of electron-selective materials such as solution-processed ZnO nanoparticles on the cathode side was examined. Here we present the photovoltaic performance of the different inverted solar cell structures. The active area of the devices was relatively large, with an area of nearly 1 cm^2.

HL 45.20 Tue 18:00 P1

Solution processed bulk heterojunction solar cells with molecularly doped active layers — •Antonietta De Sio[1], Ali Veysel Tunc[1], Elizabeth von Hauff[1], Felix Deschler[2], Enrico Da Como[2], and Jürgen Parisi[1] — [1]Energy and Semiconductor Research Laboratory, Institute of Physics, Carl von Ossietzky Universität Oldenburg, 26111 Oldenburg, Germany — [2]Photonics and Optoelectronics Group, Department of Physics and CeNS, Ludwig-Maximilians-Universität München, 80799, Munich, Germany

We report on the improvement of the device performance of polymer:fullerene bulk heterojunction solar cells by molecularly doping the active layer. 2,3,5,6-tetrafluoro-7,7,8,8-tetracyanoquinodimethane (F4-TCNQ) was used to p-dope the low bandgap polymer poly[2,6(4,4-bis-(2-ethylhexyl)-4H-cyclopenta[2,1-b:3,4-b0]-dithiophene)-alt-4,7-(2,1,3-benzothiadiazole)] (PCPDTBT) that was then blended with the soluble fullerene derivative [6,6]-phenyl-C61-butyric acid methyl ester (PCBM). Blends with different doping concentrations were investigated. We show how the short circuit current densities of the photovoltaic devices increase with the doping concentration as a result of an enhancement of the field effect mobilities.