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respectively. The band gap of P1 was successfully reduced by introducing ketone moiety in place of the ether one in the substituent of BDT and DTT in a polymer backbone. Electrochemical and photophysical studies reveal band gaps of 1.5 eV for P1. The power conversion efficiency (PCE) of 0.6% was obtained under simulated solar light AM 1.5 G (100 mW/cm²).

고정민 1PS-302
Performance of Ink-jet printed OTFT using TIPS-pentacene blended with polymeric binders

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 In recent year ink-jet printing methods have an issue in the flexible electronics because of its tremendous benefits of ink-jet printing such as the low material consumption, the possibility for mass production and the easy fabrication of variable substrates. However, the polymeric binder is essential for the device fabrication using small organic semiconducting materials having large degree of crystallinity by ink-jet printing. Because, ink-jet printing of small molecules can frequently cause the nozzle clogging phenomena. In this study, we have fabricated the ink-jet printed organic thin film transistors (OTFTs) using synthesized TIPS-pentacene, the well-known organic semiconducting material for solution process, blended with various polymeric binders. Then we investigated the electrical TFT characteristics of fabricated OTFTs depending on various polymeric binders. Also, we demonstrated the relationship between the TIPS-pentacene and each polymeric binder in active channel.

구민호 1PS-303
Nanoscale modification of physical properties of polypyrrole nanowire through focused electron-beam irradiation

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 본 연구에서는 초점전자빔 조사에 의해 부분적으로 개질된 polypyrrole(PPy) 나노선의 구조, 도핑 상태 및 전기적 특성 변화에 대해 보고한다. 나노다공성 산화알루미늄 템플레이트를 이용한 전기화학 증합방법으로 직경 ~200 nm, 길이 30~40 μm의 PPy 나노선을 제작하였다. PPy 나노선 한 가닥의 원하는 부분에 나노구조로 초점전자빔(30 keV, 1.0×10¹⁶~1.0×10¹⁹ electrons/cm²)을 조사하여 PPy 나노선을 부분적으로 개질한 직렬 이중접합형 나노선을 제작하였다. 전자빔 조사에 따른 PPy 나노선의 표면 상태 및 구조 변화는 주사전자현미경과 투과전자현미경을 이용하여 관찰하였다. 초점전자빔의 밀도 변화에 따른 PPy 나노선의 도핑 상태 감소 및 주 사슬의 구조적 변화는 Raman 스펙트럼을 통해 분석하였다. 초점전자빔 조사조건 (밀도, 개질 영역의 폭 및 개수) 변화에 따른 다양한 구조의 직렬 이중접합형 PPy 나노선의 전기적 특성을 분석하기 위해 나노선 한 가닥의 I-V 특성 곡선을 전자빔 조사 전과 후로 비교하였다. 또한 직렬 이중접합형 PPy 나노선에 대한 I-V 특성 곡선의 온도 의존성을 측정하여 전하전달 특성을 연구하였다.

권영수 1PS-304
Characterization of Solid-State Dye-Sensitized Solar Cells Utilizing Metal-Free Organic Dyes

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 Three organic TPA(triphenylamine)-based sensitizers were synthesized and their optical and electrochemical properties were characterized. Due to their relatively higher extinction coefficient when compared with ruthenium polypyridyl complex, organic dyes are considered as good candidate for sensitizers of solid-state dye-sensitized solar cells(sDSCs) with thin optimized thickness of TiO₂ up to 2 μm. As a result, solid-state organic dye-sensitized solar cells showed power conversion efficiency up to 2.5% and Z907, which have been known to be most efficient dyes for sDSCs showed 1.8% of efficiency. sDSCs with organic dyes showed higher open circuit voltage due to their high dipole moment and shift the TiO₂ conduction band energy relative to the Fermi level of the hole transport material(HTM).

권영완 1PS-305
Polyconjugated Organic Polymer Compositions exhibiting High Temperature Ferromagnetic Properties

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 Developments of the high temperature organic ferromagnetic materials have been attempted by many researchers. To achieve the ferromagnetic ordering by using organic materials, the high spin multiplicity polymer was also proposed by Koichi et al in 1968 because it may realize the magnetic storage devices with a versatile processability. Polyconjugated organic polymers have attracted an interest in the field of polymer light emitting diode, organic semiconductor and organic solar cell for the potential use. Herein, we will discuss the high temperature ferromagnetic properties of MEH-PPV and P3HT compositions doped with Fe(III)Pc complexes. We studied their magnetic properties by electron paramagnetic resonance and SQUID studies.

권준 1PS-306

Peptide/Graphene Hybrid Assembly into Core/Shell Nanowires
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Hybrid assembly of peptides and graphene into core/shell nanowires is presented here. Electroconductive nanowires comprised of multilayered graphene shells wrapped around peptide nanowire cores were readily assembled upon diluting peptide solution into an aqueous reduced graphene dispersion. Calcination of peptide cores generated a hollow graphene-shell network with large surface area and high thermal/chemical stability.

김경식 1PS-307

Ladder-Type Heteroacene Polymers Bearing Carbazole and Thiophene Ring Units and Their Use in Field-Effect Transistors and Photovoltaic Cells
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A ladder-type π-excessive conjugated monomer(dicyclopentathienocarbazole) integrating the structural components of carbazole and thiophene into a single molecular entity is synthesized and polymerized by oxidative coupling to yield poly(dicyclopentathienocarbazole) (PDCPTCz). Moreover, through the careful selection of 2,1,3-benzothiadiazole unit as a π-deficient building block, the dicyclopentathienocarbazole-based copolymer(poly(dicyclopentathienocarbazole-alt-2,1,3-benzothiadiazole) (PDCPTCz-BT) is prepared by Suzuki polycondensation. The optical, electrochemical, and field-effect charge transport properties of the resulting polymers (PDCPTCz and PDCPTCz-BT) are not only characterized in detail but also their bulk-heterojunction (BHJ) solar cell in combination with PC₇₁BM are evaluated.

김광연 1PS-308

Synthesis and characterization of a new copolymer for use in high-performance solar cells
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New copolymer, P1 was synthesized and characterized. P1 consisted of alternating 2,7-(9,9-dioctylfluorene) and (E)-2,3-bis(2'-thienyl)acrylonitrile. As introducing withdrawing groups in backbone chain, the energy levels, absorption spectra, and band gaps of the resulted polymers were effectively turned. P1 was blended with [60]PCBM. The highest occupied molecular orbital (HOMO) and lowest unoccupied molecular orbital (LUMO) levels of P1 is well aligned with those of PCBM acceptor. Bulk heterojunction solar cells with these polymers as electron doner and (6, 6)-phenyl-C61-butiric acid methyl ester ([60]PCBM) as electron acceptor exhibits high Voc and power conversion efficiency (PCE).

김기현 1PS-309

Syntheses of Triphenylamine-based Organic Dyes and Effects of Molecular Structure on the Photovoltaic Performances of Dye-sensitized Solar Cells
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Organic dyes have many advantages as dyes for DSSCs, such as higher molar absorption coefficients, the wide variety of the structures. Thus, We synthesized three organic dyes (N-TPA, F-TPA, and F-TPA-T) based on the triphenylamine (TPA) moiety as an electron donor and cyanoacrylic acid moiety as an electron acceptor to study the effect of molecular structure on the performance of the resulting dye-sensitized solar cells devices. The electron donor group was modified with the 9-fluorenylidene substituent and the thiophene unit was introduced as a π-conjugated bridge. The F-TPA-T sensitized cell showed the highest overall conversion efficiency of 4.25% (J_{sc}: 10.5 mA/cm², V_{oc}: 0.70 V, FF: 0.58), while the N-TPA sensitized cell showed the lowest value of 3.26% (J_{sc}: 6.55 mA/cm², V_{oc}: 0.77 V, FF: 0.64) among the cells based on the three organic dyes, as compared to 5.12% for the cell based on the N719 dye (J_{sc}: 13.0 mA/cm², V_{oc}: 0.69 V, FF: 0.57) under AM 1.5 illumination.

김기환 1PS-310

Investigation of Impedance Spectroscopy Based on P3HT:PCBM Bulk Heterojunction Polymer Solar Cells
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The charge transfers of each interface layer in polymer solar cells such as between blend of poly (3-hexylthiophene) (P3HT) and [6,6]-phenyl C61-butiric acid methyl ester (PCBM) as an active layer, Poly(3,4-ethylenedioxythiophene):poly (styrenesulfonic) acid (PEDOT:PSS) as an anode side buffer layer, indium-tin-oxide (ITO) as an anode electrode, and aluminium as a cathode electrode have been analyzed under the dark condition and illumination (100 mWcm⁻²) by means of impedance spectroscopy. Impedance measurements show that charge transfer at the interface between PEDOT:PSS and ITO have been observed at high frequency and, several