

Isoindigo-based Polymers for High Performance Polymer Solar Cells

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Abstract

Isoindigo is a dye molecule with two lactam rings pertaining strong electron-withdrawing characteristic and planar π -conjugated structure, which provides broad optical absorption, high extinction coefficient, and deep HOMO energy level. Therefore, isoindigo is a promising building block for constructing low bandgap conjugated polymers to achieve high performance polymer solar cells (PSCs).

We synthesized random conjugated copolymers consisting of DPP and isoindigo as co-electron donor units in donor-acceptor type conjugated copolymer for panchromatic absorption. The copolymer containing equal amount of DPP and isoindigo in the copolymer absorbs wide range of solar spectrum from 600 to 900 nm with low HOMO level. Under the optimized condition, the copolymer-based PSC exhibits a promising PCE of 6.04%, which are superior to the values of the two corresponding homopolymers. We also synthesized highly π -extended conjugated low bandgap polymer composed of isoindigo (il) and thienylvinylene (TVT) and compared the photovoltaic properties of PiITVT with those of PiI2T, in order to examine the effect of vinylene linkage on the photovoltaic properties of isoindigo-based polymers. The solar cell device fabricated from PiITVT:PC₆₁BM blend exhibited a PCE of 7.09%, which is much higher than the best PCE of PiI2T:PC₇₁BM blend.

Keywords: polymer solar cells, isoindigo, random conjugated copolymer.



Date: January 8, 2014

Professor Dr. Won Ho Jo
Seoul National University, South Korea

Subject: Speaker invitation for MACRO 2014

Dear Professor Dr. Won Ho Jo,

The International Union of Pure and Applied Chemistry, the Chemical Society of Thailand (CST) under the patronage of Professor Dr. HRH Princess Chulabhorn, the Polymer Society (Thailand), and Faculty of Science, Chiangmai University will host **the 2014 IUPAC World Polymer Congress or MACRO 2014 during 6 – 11 July 2014, Chiang Mai province, Thailand.** The MACRO2014 will provide the unprecedented opportunity for participants to learn the most recent advancement of polymer science and technology, as well as the occasion to bring together the participants from across region and around the world for discussion, collaboration, and networking. We expect that more than 1500 participants from all over the world would attend this conference.

On the behalf of scientific committee, we would like to invite you to be our **Invited Speaker** for the session **“Polymers for Emerging Technology: Energy, Information Technology, Optics, Electronics, and Opto-electronics”** which is co-organized by **Professor Dr. Elsa Reichmanis** this coming conference. **We would like to request for your tentative title and abstract, CV and your photo which will be uploaded to our website.** Your lecture details will be submitted to you soon. We trust that your experience shared during the conference will be very fruitful for our participants and this would be a great honor for us all. We are now looking forward to hearing from you soonest.

As a part of the organizing committee, we would like to offer:

1. Conference registration fee waive
2. Complementary excursion

Yours sincerely,

Supawan Tantayanon
Chairperson of MACRO 2014

Wild Blue Congress Organizer

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Tuesday, July 8, 2014 @Room B7

Time	Code	Title	Author
13.15	I-5	Block Copolymer Membrane Design	Suzana Pereira Nunes
13.45	I-6	Ultraflexible Organic Devices for Biomedical Applications	Takao Someya
14.15	O-5	Materials Containing Electron- and Hole-transporting Groups: Synthesis, Characterization and Optoelectronic Applications	Chia-Shing Wu, Yun Chen
14.35	O-6	Design of new fluorinated polymer-based nanocomposites via combination of sol-gel chemistry and reactive extrusion for polymer electrolyte membranes fuel cells	Véronique Bounor-Legaré, Serigne Seck, Jean-Francois Gérard, Pierrick Buvat, Janick Bigarré, Bruno Ameduri, Jérôme Chauveau
14.55	O-7	Amphiphilic block copolymers PMMA-b-PMAA and PMMA-b-P(MMA-co-ZnMAAc) synthesized by RAFT polymerization, for the preparation of UV-absorptive PMMA/ZnO nanocomposites	Tomaž Kos, Alojz Anžlovar, Ema Žagar, Zorica Crnjak Orel, Majda Zigon
15.15	O-8	Spherical polyelectrolyte brushes of poly(sodium 4-styrenesulfonate) obtained by surface initiated radical polymerization upon functionalized silica nanoparticles	Victor R. Sepulveda, Licia Sierra and Betty L. Lopez
15:50	<i>Break</i>		
16:00	I-7	Block Copolymers in Organic Photovoltaics	Paul Topham
16:30	I-8	Isoindigo-based Polymers for High Performance Polymer Solar Cells	Won Ho Jo
17:00	O-9	Cyanine Dye Polyelectrolytes for Organic Bilayer Solar Cells	Lei Wang, Christian Hinderling, Frank Nüesch, Roland Hany
17:20	O-10	Tuning of Organic Electronic Device Performance by Means of UV-Light	Matthias Edler, Thomas Griesser, Marco Marchl, Egbert Zojer, Andreas Pavitschitz
17:40	O-11	Versatile Functional Poly(3-hexylthiophene) for Hybrid Particles Synthesis by Grafting Onto Technique : Core@Shell ZnO Nanorods for Photo Voltaic devices	Christine Dagon-Lartigau, Hussein Awada, Marie-Hélène Delville, Roger C Hiorns, Laurent Billon
18:00	<i>Poster Session</i>		