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Education / Experience

1975 ~ 1980 B. S. in Applied Chemistry, Seoul National University.
1980 ~ 1982 M. S. in Applied Chemistry, Seoul National University
1983 ~ 1986 Ph. D. in Polymer Science, University of Akron
1986 ~ 1987 Postdoctoral Fellow, University of Akron
1987 ~ 1988 Visiting Scientist, IBM Research Center
1988 ~ Professor, Department of Chemical Engineering, POSTECH
2005 ~ Director, Polymer Research Institute, POSTECH
2011 ~ Director, Center for Advanced Soft Electronics

Awards and Honors

1999 Best Paper Award, The Korean Federation of Science and Technology Societies
2004 Outstanding Research Award, The Polymer Society of Korea
2007 Distinguished Research Award, Gyeongbuk Province, Korea
2008 NanoKorea Award, Ministry of Science and Technology, Korea
2009 Proud Postechian Award, POSTECH
2009 Fellow, The Korean Academy of Science and Technology
2010 Scientist of the Month, Ministry of Education, Science, and Technology

Research Interests

- Polymer Surface, Interface, and Thin Film
- Organic Electronic Materials
 Organic Field-Effect Transistors, Organic Photovoltaic Solar Cells
- Graphene Based Materials and Electronics

Publication

Over 260 SCI papers(h-index 46), 45 Patents

Recent Publications

1. S. G. Lee, et al. "Evaporation-Induced Self-Alignment and Transfer of Semiconductor Nanowires by Wrinkled Elastomeric Templates", *Adv. Mater.* 2013, 15, 2106
2. H. H. Choi, et al. "Decoupling the Bias-Stress-Induced Charge Trapping in Semiconductors and Gate-Dielectrics of Organic Transistors Using a Double Stretched-Exponential Formula", *Adv. Funct. Mater.* 2013, 23, 690
3. J. Park, et al. "Single-Gate Bandgap Opening of Bilayer Graphene by Dual Molecular Doping", *Adv. Mater.* 2012, 24, 407
4. W. H. Lee, et al., "The Influence of the Solvent Evaporation Rate on the Phase Separation and Electrical Performances of Soluble Acene-Polymer Blend Semiconductors" *Adv. Funct. Mater.* 2012, 22, 267
5. S. B. Jo, et al., "High Performance Organic Photovoltaic Cells Using Polymer-Hybridized ZnO Nanocrystals as a Cathode Interlayer", *Adv. Energy Mater.* 2011, 1, 690
6. W. H. Lee, et al., "Surface-Directed Molecular Assembly of Pentacene on Monolayer Graphene for High-Performance Organic Transistors", *J. Am. Chem. Soc.* 2011, 133, 4447

Surface-Directed Molecular Assembly of Organic Semiconductors for High-Performance Organic Transistors

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Microstructure in organic semiconductor thin films critically determines the charge carrier mobility (μ_{FET}) in organic field-effect transistors (OFETs). In the case of bottom-contact OFETs, the surface characteristics of both gate dielectric and source/drain (S/D) electrodes can govern the mesoscale and/or nanoscale ordering of the semiconductor assembled on them. Here, we present various approaches for controlling the growth of organic semiconductors on the gate dielectric and S/D electrodes to achieve high performance OFETs. Firstly, we demonstrate that polymer residues remaining on the surface of graphene electrodes induce a stand-up orientation of pentacene, thereby controlling pentacene growth such that the molecular assembly is optimal for charge transport. Thus, pentacene FETs using S/D monolayer graphene electrodes with polymer residues showed a high μ_{FET} of 1.2 cm²/V·s. Secondly, we found that the grain size of a ordered self-assembled monolayer (SAM), which were constructed on the gate-dielectric surface, considerably affect the microstructure of a pentacene thin film. The grain boundaries of an underlying SAM were found to act as structural defects in the context of the packing and rearrangement of pentacene molecules during pentacene growth. As a result, the deposited pentacene films on the SAM with lower density of grain boundaries showed better OFET performance. Thirdly, we report a macroporous high-quality pentacene thin film assisted by a sequential deposition of pentacene and small-molecular insulating layers. We found that the underlying soft insulating small molecules with low glass transition temperature and strong intermolecular interaction with pentacene activated the 2-dimensional growth of pentacene, thus resulted in the structural homogeneity with far less grain boundaries of the pentacene layers. Furthermore, this single crystal-like pentacene thin films yielded considerably high pentacene μ_{FET} , up to 6.3 cm²/V·s.

Organic Dyes for Organic and Dye-Sensitized Solar Cell Applications

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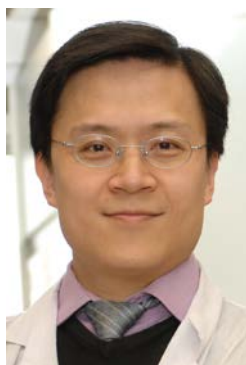
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Organic molecules have become a field of intense activities in the photovoltaic research. They hold great promise as versatile functional materials for use as absorbers and photosensitizers in solar energy harvesting. This lecture highlights the recent progress in the advances of numerous functional organic dyes in organic and dye-sensitized solar cells for solar power generation. The strategies based on structural modifications of the organic groups to tune the photovoltaic properties of these materials will be presented and discussed.

References:

- (1) C. Cui, J. Min, C.-L. Ho, T. Ameri, P. Yang, J. Zhao, C.J. Brabec, W.-Y. Wong, *Chem. Commun.* **2013**, 49, 4409; (2) Q. Liu, H. Zhan, C.-L. Ho, F.-R. Dai, Y. Fu, Z. Xie, L. Wang, J.-H. Li, F. Yan, S.-P. Huang, W.-Y. Wong, *Chem. Asian J.* **2013**, 8, 1892; (3) D. Ye, X. Li, L. Yan, W. Zhang, Z. Hu, Y. Liang, J. Fang, W.-Y. Wong, X. Wang, *J. Mater. Chem. A* **2013**, 1, 7622; (4) Y. Hua, S. Chang, D. Huang, X. Zhou, X. Zhu, J. Zhao, T. Chen, W.-Y. Wong, W.-K. Wong, *Chem. Mater.* **2013**, 25, 2146; (5) C. Qin, W.-Y. Wong, L. Han, *Chem. Asian J.* **2013**, 8, 1706; (6) Y. Hua, B. Jin, H. Wang, X. Zhu, W. Wu, M.-S. Cheung, Z. Lin, W.-Y. Wong, W.-K. Wong, *J. Power Sources* **2013**, 237, 195; (7) S. Chang, H. Wang, Y. Hua, Q. Li, X. Xiao, W.-K. Wong, W.-Y. Wong, X. Zhu, T. Chen, *J. Mater. Chem. A* **2013**, 1, 11553.

Biography



Wai-Yeung Wong received BSc (1992) and PhD (1995) degrees from the University of Hong Kong with the PhD work under the tutelage of Prof. Wing-Tak Wong. After a postdoctoral year with Prof. F. Albert Cotton in Texas A&M University in 1996, he worked for Profs. The Lord Jack Lewis (FRS) and Paul R. Raithby at the University of Cambridge in 1997. He joined Hong Kong Baptist University as an Assistant Professor in 1998, rising through the academic ranks to Chair Professor in Chemistry in early 2011. Professor Wong is internationally renowned for his research in metallopolymers and metallo-organic molecules with energy functions and photofunctional properties. He has made profound contributions in the field of organometallic optoelectronics and photovoltaics. His research focuses on synthetic inorganic and organometallic chemistry and structural chemistry, with special emphasis on developing novel molecular functional materials and polymers containing late transition metal elements, setting a common goal especially towards advancing energy-related technologies.

He has a distinguished publication record of ~400 scientific articles to date and his current h-index is 53. He becomes the first Chinese scientist to be presented with the Chemistry of the Transition Metals Award by the Royal Society of Chemistry in 2010. He is also the recipient of the First Class Prize in Natural Science Award from Ministry of Education of China in 2010 and the FACS Distinguished Young Chemist Award in 2011, and has won the Distinguished Lectureship Award from The Chemical Society of Japan in 2012. Recently, he was also awarded the Ho Leung Ho Lee Foundation Prize for Scientific and Technological Innovation in 2012. Professor Wong is currently the Associate Editor of *Journal of Materials Chemistry C* and Regional Editor of *Journal of Organometallic Chemistry*, and serves on the editorial/international advisory boards of numerous international scientific journals including *Dalton Transactions*, *Dyes and Pigments*, *Macromolecular Rapid Communications*, *Macromolecular Chemistry & Physics*, *Comments on Inorganic Chemistry*, *Journal of Inorganic & Organometallic Polymers & Materials*, and *Current Organic Chemistry*, etc. At present, he is also the Chairman of the Hong Kong Chemical Society.