

Jung Hwa Seo

CURRICULUM VITAE

Jung Hwa Seo, Ph. D
Assistant Professor

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ACADEMIC POSITION

- 2011.3 ~ current **Assistant Professor**
 Dept. of Materials Physics, College of Natural Science, Dong-A University
 Busan, Republic of Korea
- 2007.11 ~ 2011.2 **Postdoctoral Researcher**
 Center for Polymers and Organic Solids, Department of Physics, Department of
 Chemistry and Biochemistry, University of California Santa Barbara, CA
 (Advisors: Prof. Guillermo C. Bazan, Prof. Thuc-Quyne Nguyen, and Prof. Alan J.
 Heeger)
 Project :
 (i) Electronic Structures of Conjugated Polyelectrolytes and Donor-Acceptor Materials
 for Organic Optoelectronics.
 (ii) Device Fabrication and Characterization of Organic Field-Effect Transistors, Light-
 Emitting Devices and Organic Solar Cells.

EDUCATION

- 2003.3 ~ 2007.8 **Ph. D. in Physics and Applied Physics**

Jung Hwa Seo

Yonsei University, Seoul, Korea (Supervisor : Prof. Chung Nam Whang)

Thesis : Fabrication and Spectroscopic study of Rubrene-based Organic Thin-Film Transistors

2001.3 ~ 2003.2 **M. S. in Physics and Applied Physics**

Yonsei University, Seoul, Korea (Supervisor : Prof. Chung Nam Whang)

Thesis : Surface structure of C₂H₄ on Si(001) system by using direct recoil spectroscopy

1997.3 ~ 2001.2 **B. S. in Physics (Magna cum-laude)**

Dong-A University, Busan, Korea

EXPERIENCE

2005 ~ 2007 **Lecturer** Hong-Ik University, Seoul, Korea

Course taught : Fundamentals of Physics

2004 ~ 2005 **Lecturer** Hoseo University, Cheonan, Korea

Course taught : Solid State Physics, Fundamentals of Physics

2002 ~ 2006 **Teaching Assistant** Yonsei University, Seoul, Korea

Course taught : Statistical mechanics and Thermodynamics, Solid state physics, Fundamentals Physics

RESEARCH INTERESTS

Organic Electronics (Transistors, Light Emitting Diodes, Photovoltaics, Electrochemical Cells), Flexible Electronics, Electronic Structure of Materials

HONOR and AWARD

- The Best Woman Graduate Student Award, the Korean Physics Society (2007).
- Human Tech Paper Award for the outstanding paper, Samsung Electronics (2007).
- Recipient of the scholarship for graduate study granted by Hynix Semiconductor Company (2004-2007).
- Brain Korea 21 Program Scholarship (2001-2007).
- The Best Academic Research in the Institute Physics and Applied Physics, Yonsei University (2006).
- The prize for the outstanding papers in the conference of “*Optic and Photonics 2005*”, The

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International Society for Optical Engineering (2005).

- The Best Academic Research in the Institute Physics and Applied Physics, Yonsei University (2002).
- Presidential Award in Dong-A University for the Magnum Cum Laude (2001).

PUBLICATION

1. J. K. Park, J. Jo, **J. H. Seo**, J. S. Moon, Y. D. Park, K. Lee, A. J. Heeger, G. C. Bazan “End-Capping Effect of a Narrow Band-gap Conjugated Polymer on Bulk Heterojunction Solar Cells”, *Advanced Materials*, 23(21) 2430–2435, **2011**.
2. X. Gong, M. Tong, F. G. Brunetti, **J. H. Seo**, Y. Sun, D. Moses, F. Wudl, A. J. Heeger, “Bulk Heterojunction Solar Cells with Large Open-Circuit Voltage: Electron Transfer with Small Donor-Acceptor Energy Offset”, *Advanced Materials*, 23(20) 2272–2277, **2011**.
3. S. Cho, J. Lee, M. Tong, **J. H. Seo**, C. Yang, “Poly(diketopyrrolopyrrole-benzothiadiazole) with Ambipolarity Approaching 100% Equivalency”, *Advanced Functional Materials*, 21(10) 1910-1916, **2011**. - Selected for Inside Front Cover.
4. A. Varotto, N. D. Treat, J. Jo, C. G. Shuttle, N. A. Batara, F. G. Brunetti, **J. H. Seo**, M. L. Chabinyc, C. J. Hawker, A. J. Heeger, F. Wudl. “1,4-fullerene derivatives: tuning the properties of the electron transporting layer in bulk-heterojunction solar cells”, *Angewandte Chemie International Edition*, 50(22) 5166-5169, **2011**.
5. K. Siskova, K. Safarova, **J. H. Seo**, R. Zboril, M. Mashlan, “Non-chemical approach toward 2D self-assemblies of Ag nanoparticles via cold plasma treatment of substrates”, *Nanotechnology*, 22, 275601, 2011.
6. Y. Sun, C. J. Takacs, S. R. Cowan, **J. H. Seo**, X. Gong, A. Roy, A. J. Heeger, “Efficient, Air-Stable Bulk Heterojunction Polymer Solar Cells Using MoO_x as the Anode Interfacial Layer”, *Advanced Materials*, 23(19), 2226-2230, **2011**.
7. **J. H. Seo**, A. Gutacker, Y. Sun, H. Wu, F. Huang, Y. Cao, U. Scherf, A. J. Heeger, G. C. Bazan, “Improved High-Efficiency Organic Solar Cells via Incorporation of a Conjugated Polyelectrolyte Interlayer”, *Journal of the American Chemical Society*, 133 (22), 8416–8419, **2011**.
8. D. H. Wang, D. Y. Kim, K. W. Choi, **J. H. Seo**, S. H. Im, J. H. Park, O. O. Park, A. J. Heeger, “Enhancement of power conversion efficiency from Au nanoparticles in donor-acceptor polymer bulk-heterojunction solar cells”, *Angewandte Chemie International Edition*, 50(24) 5404, **2011**.
9. E. Amir, K. Sivanandan, J. E. Cochran, J. J. Cowart, S.-Yu Ku, **J. H. Seo**, M. L. Chabinyc, C. J. Hawker, “Synthesis and characterization of soluble low bandgap oligothiophene-[all]-S,S-dioxides

- based conjugated oligomers and polymers”, *Journal of Polymer Science Part A: Polymer Chemistry* 49(9) 1933-194, **2011**.
10. S. K. Lee, S. Cho, M. Tong, **J. H. Seo**, and Alan J. Heeger, "Effects of Substituted Side-Chain Position on Donor–Acceptor Conjugated Copolymers", *Journal of Polymer Science Part A: Polymer Chemistry* 49(8), 1821–1829, **2011**.
 11. Y. Sun, **J. H. Seo**, C. J. Takacs, J. Seifter, A. J. Heeger, “Inverted Polymer Solar Cells Integrated with a Low-Temperature-Annealed Sol-Gel-Derived ZnO Film as an Electron Transport Layer”, *Advanced Materials*, 23(14) 1679–1683, **2011**.
 12. **J. H. Seo**, S. Cho, M. Leclerc, A. J. Heeger, “Energy level alignments at poly[N=9]-hepta-decanyl-2,7-carbazole-alt-5,5-(4',7'-di-2-thienyl-2',1',3'-benzothiadiazole)] on metal and polymer interfaces”, *Chem. Phys. Lett.* 503, 101-104, **2011**.
 13. Y. Sun, M. Wang, X. Gong, **J. H. Seo**, B. B. Y. Hsu, F. Wudl, A. J. Heeger, “Polymer bulk heterojunction solar cells: function and utility of inserting a hole transport and electron blocking layer into the device structure”, *Journal of Material Chemistry*, 21, 1365-1367, **2011**.
 14. M. Wang, Y. Sun, M. Tong, E. S. Chesnut, **J. H. Seo**, R. Kumar, F. Wudl, “The N=S=N Link as Electron Accepting Moiety for Stable, Solution-Processable Conjugated Oligomers”, *Journal of Polymer Science Part A: Polymer Chemistry*, 49(2) 441-451, **2011**.
 15. Y. D. Park, J. K. Park, **J. H. Seo**, J. D. Yuen, W. H. Lee, K. Cho, G. C. Bazan, “Solubility-controlled self-assembled of conjugated polymer for high-performance organic field-effect transistors”, *Advanced Energy Materials*, 1, 63-67, **2011**.
 16. H. Kim, **J. H. Seo**, E. Y. Park, T.-D. Kim, K. Lee, K.-S. Lee, S. Cho, A. J. Heeger, “Increased open-circuit voltage in bulk-heterojunction solar cells using a C₆₀ derivative”, *Applied Physics Letters* 97, 193309, **2010**.
 17. X.-D. Dang, A. B. Tamayo, **J. H. Seo**, C. V. Hoven, B. Walker, T.-Q. Nguyen, “Nanostructure and optoelectronic characterization of small molecule bulkheterojunction solar cells by photoconductive atomic force microscopy”, *Advanced Functional Materials*, 20, 1253, **2010**. - **Selected for Frontispiece, Vol. 20, Issue 19, 2010**.
 18. **J. H. Seo**, E. B. Namdas, A. Gutacker, A. J. Heeger, G. C. Bazan, “Conjugated polyelectrolytes for organic light-emitting transistors”, *Applied Physics Letters*, 97, 043303, **2010**.
 19. S. Cho, **J. H. Seo**, S. H. Park, S. Beaupré, M. Leclerc, A. J. Heeger, “A thermally stable semiconducting polymer”, *Advanced Materials*, 22, 1253, **2010**.
 20. **J. H. Seo**, A. Gutacker, B. Walker, S. Cho, A. Garcia, R. Yang, T.-Q. Nguyen, A. J. Heeger, G. C. Bazan, “Improved injection in n-type organic transistors with conjugated polyelectrolytes”, *Journal*

- of the American Chemical Society*, 131, 18220, **2009**.
21. B. Walker, A. B. Tamayo, X. D. Dang, P. Zalar, **J. H. Seo**, A. Garcia, M. Tantiwiwat, T.-Q. Nguyen, "Nanoscale phase separation and high photovoltaic efficiency in solution-processed, small-molecule bulk heterojunction solar cells", *Advanced Functional Materials*, 19, 3063, **2009**. - **Selected for inside front cover, Vol. 19, Issue 19, 2009**.
 22. H. Li, Y. Xu, C. V. Hoven, C. Li, **J. H. Seo**, G. C. Bazan, "Molecular design, device function and surface potential of zwitterionic electron injection layers", *Journal of the American Chemical Society*, 131, 8903, **2009**.
 23. S. Cho, **J. H. Seo**, K. Lee, A. J. Heeger, "Enhanced performance of fullerene n-channel field-effect transistors with titanium sub-oxide injection layer", *Advanced Functional Materials*, 19, 1459, **2009**.
 24. **J. H. Seo**, Y. Jin, J. Z. Brzezinski, B. Walker, T.-Q. Nguyen, "Exciton binding energies in conjugated polyelectrolyte films", *ChemPhysChem*, 10, 1023, **2009**.
 25. A. B. Tamayo, X.-D. Dang, B. Walker, **J. H. Seo**, T. Kent, T.-Q. Nguyen, "A low band gap, solution-processable oligothiophene with a dialkylated diketopyrrolopyrrole chromophore for use in bulk heterojunction solar cells", *Applied Physics Letters*, 94, 103301, **2009**.
 26. **J. H. Seo**, R. Yang, J. Z. Brzezinski, B. Walker, G. C. Bazan, T.-Q. Nguyen, "Electronic properties at gold/conjugated polyelectrolyte interfaces", *Advanced Materials*, 21, 1006, **2009**.
 27. S. Cho, **J. H. Seo**, S. H. Kim, S. Song, Y. Jin, K. Lee, H. Suh, A. J. Heeger, "Effect of substituted side chain on donor-acceptor conjugated copolymers", *Applied Physics Letters*, 93, 263301, **2008**.
 28. **J. H. Seo**, G. S. Chang, R. Wilks, C. N. Whang, K. H. Chae, S. Cho, K.-H. Yoo, A. Moewes, "Unipolar-to-ambipolar conversion of organic thin-film transistors by organosilane self-assembled monolayer", *Journal of Physical Chemistry B*, 112, 16266, **2008**.
 29. J. Peet, A. B. Tamayo, X.-D. Dang, **J. H. Seo**, T.-Q. Nguyen, "Small molecule sensitizers for near-infrared absorption in polymer bulk heterojunction solar cells", *Applied Physics Letters*, 93, 163306, **2008**. - **Selected for Virtual Journal of Nanoscale Science & Technology, Nov. 3, 2008**.
 30. N. S. Cho, S. Cho, M. Elbing, J. K. Lee, R. Yang, **J. H. Seo**, K. Lee, G. C. Bazan, A. J. Heeger, "Organic thin-film transistors based on α,ω -dihexyldithienyl-dihydrophenanthrene", *Chemistry of Materials*, 20, 6289, **2008**.
 31. N. S. Cho, S. K. Lee, **J. H. Seo**, M. Elbing, J. D. Azoulay, J. Park, S. Cho, A. J. Heeger, G. C. Bazan, " α,ω -dihexylthienoselenophene derivatives: new class of high-performance semiconductors for organic thin-film transistors", *Journal of Materials Chemistry*, 18, 4909, **2008**.
 32. D. S. Park, W. C. Jang, S. W. Cho, **J. H. Seo**, I. S. Jeong, T. W. Kim, G. S. Chang, A. Moewes, K. H. Chae, K. Jeong, K.-H. Yoo, C. N. Whang, "Influence of 2-mercapto-5-nitrobenzimidazole

- treatment on the electronic characteristics of bottom-contact organic field-effect transistors”, *Organic Electronics*, 8, 1010, **2008**.
33. **J. H. Seo**, T.-Q. Nguyen, “Electronic properties of conjugated polyelectrolytes thin films”, *Journal of the American Chemical Society*, 130, 10042, **2008**.
34. **J. H. Seo**, T. Pedersen, G. S. Chang, A. Moewes, K. -H. Yoo, S. J. Cho, C. N. Whang, “Probing interfacial characteristics of rubrene/pentacene and pentacene/rubrene bilayers with soft x-ray spectroscopy”, *Journal of Physical Chemistry B*, 111, 9513, **2007**.
35. **J. H. Seo**, C. Y. Kim, S. J. Kang, K. -H. Yoo, C. N. Whang, A. Moewes, G. S. Chang “Electronic structure of NPB and BCP molecules probed by x-ray emission spectroscopy”, *Journal of Chemical Physics*, 126, 064706, **2007**.
36. S. W. Cho, Y. Yi, **J. H. Seo**, C. Y. Kim, M. Noh, K.-H. Yoo, K. Jeong, C.-N. Whang “Origin of charge transfer complex resulting in Ohmic contact at the C₆₀/Cu interface”, *Synthetic Metals*, 157, 160, **2007**. - **Selected Cover letter**
37. **J. H. Seo**, D. S. Park, S. W. Cho, C. Y. Kim, W. C. Jang, C. N. Whang, K.-H. Yoo, G. S. Chang, T. Pedersen, A. Moewes, K. H. Chae, S. J. Cho “Buffer layer effect on the structural and electrical properties of rubrene-based organic thin-film transistors”, *Applied Physics Letters*, 89, 163505, **2006**.
38. **J. H. Seo**, S. J. Kang, C. Y. Kim, K. H. Yoo, C. N. Whang, “Energy level alignment of C₆₀/Co using x-ray and UV photoelectron spectroscopy”, *Journal of Physics: Condensed Matter*, 18, S2055, **2006**.
39. **J. H. Seo**, S. J. Kang, C. Y. Kim, K. H. Yoo, C. N. Whang “Investigation of the Energy Level Alignment of C₆₀ and Co by using UV photoelectron spectroscopy”, *Journal of Korean Physics Society*, 48, 1472, **2006**.
40. **J. H. Seo**, J. Y. Park, C. N. Whang, K.-H. Yoo, S. S. Kim, D. S. Choi, K. H. Chae “One-dimensional ordered structure of C₂H₄ on an Si(001) surface”, *Journal of Korean Physics Society*, 49, 167, **2006**.
41. S. W. Cho, **J. H. Seo**, C. Y. Kim, K. H. Yoo, K. Jeong, C. N. Whang, Y. Yi, S. J. Kang, M. Noh “Evidence of the C₆₀/Cu contact formation after thermal treatment”, *Applied Physics Letters*, 88, 151103, **2006**.
42. **J. H. Seo**, S.J. Kang, C.Y. Kim, S.W. Cho, K.-H. Yoo, C.N. Whang “Energy level alignment between C₆₀ and Al using ultraviolet photoelectron spectroscopy”, *Applied Surface Science*, 252, 8015, **2006**.

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43. S. J. Kang, Y. Yi, C. Y. Kim, K. Cho, **J. H. Seo**, M. Noh, K. Jeong, K.-H. Yoo, C. N. Whang "Ambipolar organic thin-film transistors using C₆₀/pentacene structure: Characterization of electronic structure and device property", *Applied Physics Letters*, 87, 233502, **2005**.
44. D. S. Choi, D. H. Kim, B. D. Yu, J. Y. Park, **J. H. Seo**, C. N. Whang "Ag adsorption on W(110) plane", *Modern Physics Letters*, 19, 1323, **2005**.
45. **J. H. Seo**, J. Y. Park, S. K. Jung, K.-H. Yoo, C. N. Whang, S.S. Kim, D.S. Choi, K.H. Chae "Atomic arrangement of Al-induced clusters on Si(001) surface at high temperature", *Chemical Physics Letters*, 417, 72, **2005**.
46. **J. H. Seo**, C. N. Whang, K.-H. Yoo, S. S. Kim, D. S. Choi, K. H. Chae "Hydrocarbon-associated Si(001) surface structure : CAICISS", *Proc. SPIE Int. Soc. Opt. Eng.*, 5929, 592915, **2005**.
47. J. Y. Park, **J. H. Seo**, C. N. Whang, S. S. Kim, D. S. Choi, K. H. Chae "Structural determination of the low-coverage phase of Al on Si(001) surface", *Journal of Chemical Physics*, 122, 244723, **2005**.
48. J. Y. Park, **J. H. Seo**, C. N. Whang, S. S. Kim, D. S. Choi, K. H. Chae "Structural analysis of the reconstructed Si(001)-C surface", *Journal of Chemical Physics*, 122, 204705, **2005**.
49. **J. H. Seo**, C. N. Whang, S. S. Kim, D. S. Choi, K. H. Chae "Initial adsorption structure of ethylene on Si(001) surface at room temperature", *Surface Science*, 582, L129, **2005**.
50. J. Y. Park, **J. H. Seo**, J. Y. Kim, C. N. Whang, S. S. Kim, D. S. Choi, K. H. Chae "Surface structure of low-coverage Cs on Si(001)-(2×1) system", *Applied Surface Science*, 240, 305, **2004**.
51. J. Y. Kim, J. Y. Park, **J. H. Seo**, C. N. Whang, S. S. Kim, H. J. Kang, D. S. Choi, K. H. Chae "Atomic structure of Cs layer grown on Si(100)(2×1) surface at room temperature", *Surface Science*, 531, L340, **2004**.
52. J. Y. Park, **J. H. Seo**, J. Y. Kim, C. N. Whang, S. S. Kim, D. S. Choi, K. H. Chae "Ion scattering spectroscopy study of Si(001)c(4×4)-C surface reconstruction", *Journal of Korean Physics Society*, 45, 614, **2004**.
53. J. Y. Kim, J. Y. Park, **J. H. Seo**, C. N. Whang, S. S. Kim, H. J. Kang, D. S. Choi, K. H. Chae "Atomic structure of Cs grown on Si(100)(2×1) surface by coaxial impact collision ion scattering spectroscopy", *Current Applied Physics*, 3, 83, **2003**.

CONFERENCE (Last Five Years)

1. **J. H. Seo**, A. Gutacker, A. J. Heeger, G. C. Bazan, "Improved high efficiency organic solar cells via incorporation of a conjugated polyelectrolyte interlayer", *MRS Spring Meeting*, San Francisco, USA (2011.4).
2. **J. H. Seo**, the 3rd joint workshop with "South China University of Technology", Guangzhou, China

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- (2010.10).
3. **J. H. Seo**, A. Gutacker, B. Walker, T.-Q. Nguyen, A. J. Heeger, G. C. Bazan, "Conjugated polyelectrolytes for improved electron injection of N-type organic transistors", *International Conference on Science and Technology of Synthetic Metals*, Kyoto, Japan (2010.7).
 4. **J. H. Seo**, A. Gutacker, B. Walker, S. Cho, A. J. Heeger, G. C. Bazan, "Improved injection in n-type organic transistors with conjugated polyelectrolytes", *MRS Spring Meeting*, San Francisco, USA (2010.4).
 5. **J. H. Seo**, R. Yang, J. Z. Brzezinski, B. Walker, G. C. Bazan, T.-Q. Nguyen, "Electronic properties of conjugated polyelectrolyte thin films", *MRS Spring Meeting*, San Francisco, USA (2009.4).
 6. **J. H. Seo**, D. S. Park, S. W. Cho, C. Y. Kim, W. C. Jang, C. N. Whang, K.-H. Yoo, G. S. Chang, T. Pedersen, A. Moewes, K. H. Chae, S. J. Cho, "Buffer layer effect on the structural and electrical properties of rubrene-based organic thin film transistors", *Organic Microelectronics & Optoelectronics Workshop III*, WA (2007.7).

Recommenders

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Alan J. Heeger

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