

Youjun He

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Education

Institute of Chemistry, Chinese Academy of Sciences (ICCAS)

Ph.D. degree in Physical Chemistry 2007, 09-2010, 07

University of Science and Technology Beijing (USTB)

Master degree in Analytical Chemistry 2004, 09-2007, 07

University of Science and Technology Beijing

Bachelor degree in Applied Chemistry 2000, 09-2004, 07

Professional Experience

2012, 01- present Oak Ridge National Laboratory. Post. Doc Researcher.

2010, 08-2011, 12 University of California, Los Angeles. Post. Doc Researcher.

Research Synopsis:

1. Conjugated Polymer Donor Materials for Polymeric Solar Cell Applications.

We design and synthesis some novel conjugated polymer materials with low band gaps, high hole mobility and suitable energy levels, test their photovoltaic performance, and investigate the relationship between materials structure and their optical and electric properties.

2. Fullerene Acceptor Materials for Polymeric Solar Cell Applications.

We design and synthesis some novel fullerene materials with good solubility, high electron mobility and high energy levels, test their photovoltaic performance, and investigate the relationship between materials structure and properties.

3. Small Molecular Donor Materials for Polymeric Solar Cell Applications.

We design and synthesis some novel small molecular materials with low band gaps, good solubility, high hole mobility and suitable energy levels, test their photovoltaic performance, and investigate the relationship between materials structure and their optical and electric properties.

4. Conjugated Polymers for Fundamental Research

We also design and synthesis some novel conjugated polymers including deuterated and water-soluble polymers, investigate their assembly and morphology under different conditions, and also investigate the influence of their structure on the properties of absorption, molecular packing in the solution and solid state, photoluminescence, lower critical solution temperature and upper critical solution temperature, viscosity, hydrophobic, hydrophilic and the glass transition temperature.

HONORS

- 2001: People's Scholarship.
- 2002: National Prize Scholarship.
- 2003 and 2004: Merit Student of USTB (two times).
- 2004: Excellent Graduate of USTB.
- 2006: Merit Graduate Student of USTB.
- 2007: Merit Student of CAS.

Publications Full list follows CV

Publication list:

1. **Youjun He**, Jingbi You, Letian Dou, Chun-Chao, Chen, Eric Richard, Kitty C. Cha, Yue Wu, Gang Li and Yang Yang*, “High performance low band gap polymer solar cells with a non-conventional acceptor”., *Chem. Commun.*, 2012, 48, pp. 7616-7618.
2. **Youjun He**, Chun-Chao Chen, Eric Richard, Letian Dou, Yue Wu, Gang Li and Yang Yang*, “Novel fullerene acceptors: synthesis and application in low band gap polymer solar cells”., *J. Mater. Chem.*, 2012, 22, pp. 13391-13394.
3. Letian Dou, Jingbi You, Jun Yang, Chun-Chao Chen, **Youjun He**, Seiichiro Murase, Tom Moriarty, Keith Emery, Gang Li and Yang Yang*, “Tandem polymer solar cells featuring a spectrally matched low-bandgap polymer”., *Nature Photonics* 2012, 6, pp. 180-185.
4. Letian Dou, Jing Gao, Eric Richard, Jingbi You, Chun-Chao Chen, Kitty C. Cha, **Youjun He**, Gang Li, and Yang Yang*, “Systematic Investigation of Benzodithiophene- and Diketopyrrolopyrrole-Based Low-Bandgap Polymers Designed for Single Junction and Tandem Polymer Solar Cells”., *J. Am. Chem. Soc.*, 2012, 134, pp. 10071-10079.
5. Chaohua Cui, Haijun Fan, Xia Guo, Maojie Zhang, **Youjun He**, Xiaowei Zhan and Yongfang Li*, “Synthesis and photovoltaic properties of D-A copolymers of benzodithiophene and naphtho[2,3-c]thiophene-4,9-dione”., *Polym. Chem.* 2012, 3, pp. 99-104.
6. Huan Wang, **Youjun He**, Yongfang Li, and Hongmei Su*, “Photophysical and electronic properties of five PCBM-like C60 derivatives: spectral and quantum chemical view”., *J. Phys. Chem. A.*, 2012, 116, pp. 255-262.
7. Guangjin Zhao, **Youjun He**, Bo Peng and Yongfang Li*, “Effect of device fabrication conditions on photovoltaic performance of polymer solar cells based on poly(3-hexylthiophene) and indene-C70 bisadduct”., *Chinese Journal of Chemistry* 2012, 30, pp. 19-22.
8. **Youjun He**, Bo Peng, Guangjin Zhao, Yingping Zou, Yongfang Li*, “Indene addition of [6, 6]-phenyl-C₆₁-butyric acid methyl ester for high performance acceptor in polymer solar cells”., *J. Phys. Chem. C.*, 2011, 115, pp. 4340-4344.
9. **Youjun He**, Yongfang Li*, “Fullerene derivative acceptors for high performance polymer solar cells”., *Phys. Chem. Chem. Phys.*, 2011, 13, pp. 1970-1983.
10. **Youjun He**, Hsiang-Yu Chen, Guangjin Zhao, Jianhui Hou*, and Yongfang Li*, “Biindene-C₆₀ adducts for the application as acceptor in polymer solar cells with higher open-circuit-voltage”., *Sol. Energy Mater. Sol. Cells.*, 2011, 95, pp. 899-903.
11. **Youjun He**, Hsiang-Yu Chen, Guangjin Zhao, Jianhui Hou*, Yongfang Li*, “Synthesis and photovoltaic properties of biindene-C₇₀ monoadduct as acceptor in polymer solar cells”., *Sol. Energy Mater. Sol. Cells.*, 2011, 95, pp. 1762-1766.

12. Jing Zhang, Dan Deng, Chang He*, **Youjun He**, Maojie Zhang, Zhi-Guo Zhang, Zhanjun Zhang, Yongfang Li*, “Star-Shaped Molecules with Triphenylamine core and Dicyanovinyl End-groups for Organic Solar Cells”, *Chem. Mater.*, 2011, 23, pp. 817-822.
13. Maojie Zhang, Yeping Sun, Xia Guo, Chaohua Cui, **Youjun He**, and Yongfang Li*, “Synthesis and characterization of dioctyloxybenzo[1,2-b:4,3-b']dithiophene-containing copolymers for polymer solar cells”, *Macromolecules* 2011, 44, pp. 7625-7631.
14. Guangjin Zhao, **Youjun He**, Chang He, Haijun Fan, Yun Zhao, Yongfang Li*, “Photovoltaic Properties of Poly (benzothiadiazole-thiophene-co-bithiophene) as Donor in Polymer Solar Cells”, *Sol. Energy Mater. Sol. Cells.*, 2011, 95, pp. 704-711.
15. Jun Yang, Rui Zhu, Ziruo Hong, **Youjun He**, Ankit Kumar, Yongfang Li and Yang Yang*, “A robust inter-connecting layer for achieving high performance tandem polymer solar cells”, *Adv. Mater.*, 2011, 23, pp. 3465-3470.
16. **Youjun He**, Hsiang-Yu Chen, Jianhui Hou*, Yongfang Li*, “Indene-C₆₀ bisadduct: a new acceptor for high performance polymer solar cells”, *J. Am. Chem. Soc.*, 2010, 132, pp. 1377-1382.
17. **Youjun He**, Guangjin Zhao, Bo Peng, Yongfang Li*, “High yield synthesis, electrochemical and photovoltaic properties of indene-C₇₀ bisadduct”, *Adv. Funct. Mater.*, 2010, 20, pp. 3383-3389.
18. **Youjun He**, Guangjin Zhao, Maojie Zhang, Jie Min, Yongfang Li*, “Poly(dithienosilole vinylene): a low bandgap conjugated polymer”, *Synth. Met.*, 2010, 160, pp. 1045-1049.
19. **Youjun He**, Jianhui Hou, Zhan'ao Tan, Yongfang Li*, “Synthesis and photovoltaic properties of polythiophene derivatives with side chains containing C₆₀ end group”, *J. Appl. Polym. Sci.*, 2010, 115, pp. 532-539.
20. **Youjun He**, Yi Zhou*, Guangjin Zhao, Jie Min, Xia Guo, Bo Zhang, Maojie Zhang, Jing Zhang, Yongfang Li*, Fengling Zhang, Olle Inganas, “Poly(4,8-bis(2-ethylhexyloxy)benzo[1,2-b:4,5-b'] dithiophene vinylene): Synthesis, Optical and Photovoltaic Properties”, *J. Polym. Sci. A: Polym. Chem.*, 2010, 48, pp. 1822-1829.
21. Guangjin Zhao, **Youjun He**, Yongfang Li*, “6.5% Efficiency of the polymer solar cells based on poly (3-hexylthiophene) and indene-C₆₀ bisadduct by device optimization”, *Adv. Mater.*, 2010, 22, 4355-4358.
22. Guangjin Zhao, **Youjun He**, Zheng Xu, Jianhui Hou*, Maojie Zhang, Jie Min, Hsiang-Yu Chen, Mingfu Ye, Ziruo Hong, Yang Yang*, Yongfang Li*, “Effect of carbon chain length in the substituent of PCBM-like molecules on their photovoltaic properties” , *Adv. Funct. Mater.*, 2010, 20, pp. 1480-1487.
23. Yen-Ju Cheng*, Chao-Hsiang Hsieh, **Youjun He**, Chain-Shu Hsu*, Yongfang Li*, “Combination of indene-C₆₀ bis-adduct and cross-linked fullerene interlayer leading to

- highly efficient inverted polymer solar cells”., *J. Am. Chem. Soc.*, 2010, *132*, pp. 17381-17383.
24. Xiaochen Wang, Haiqiao Wang, Yi Yang, **Youjun He**, Lei Zhang, Yongfang Li* and Xiaoyu Li*, “Zinc tetraphenylporphyrin-Fluorene Branched Copolymers: Synthesis and Light-Emitting Properties”., *Macromolecules* 2010, *43*, pp. 709-715.
 25. Maojie Zhang, Haijun Fan, Xia Guo, **Youjun He**, Zhiguo Zhang, Jie Min, Jing Zhang, Xiaowei Zhan* and Yongfang Li*, “Synthesis and photovoltaic properties of bithiazole-based donor-acceptor copolymers”., *Macromolecules* 2010, *43*, pp. 5706-5712.
 26. Maojie Zhang, Haijun Fan, Xia Guo, **Youjun He**, Zhi-Guo Zhang, Jie Min, Jing Zhang, Xiaowei Zhan and Yongfang Li*, “Synthesis and photovoltaic properties of a copolymer of benzodithiophene and bithiazole”., *Macromolecules* 2010, *43*, pp. 8714-8717.
 27. Kang Meng, Qing Ding, Shufeng Wang, Youjun He, Yongfang Li* and Qihuang Gong*, “Spatial conformation and charge recombination properties of polythiophene derivatives with thienylene–vinylene side chains investigated by static and femtosecond spectroscopy”., *J. Phys. Chem. B.*, 2010, *114*, pp. 2602-2606.
 28. **Youjun He**, Weiping Wu, Yunqi Liu*, Yongfang Li*, “High performance polymer field-effect transistors based on polythiophene derivative with conjugated side chain”., *J. Polym. Sci. A: Polym. Chem.*, 2009, *47*, pp. 5304-5312.
 29. **Youjun He**, Maojie Zhang, Jie Min, Guangjin Zhao, Yongfang Li*, "Influence of sulfur oxidation on the absorption and electronic energy levels of poly (thienothiophene) derivatives"., *J. Phys. Chem. B.*, 2009, *113*, pp. 14981-14985.
 30. **Youjun He**, Xiang Wang, Jing Zhang, Yongfang Li*, “Low Bandgap Polymers by Copolymerization of Thiophene with Benzothiadiazole”., *Macromol. Rapid Commun.*, 2009, *30*, pp. 45-51.
 31. **Youjun He**, Guangjin Zhao, Jie Min, Maojie Zhang, Yongfang Li*, “Poly(thienylene-benzothiadiazole-thienylene vinylene): a narrow bandgap polymer with broad absorption from visible to infrared region”., *Polymer* 2009, *50*, pp. 5055-5058.
 32. **Youjun He**, Yongfang Li*, “Research progress of polymer solar cells photovoltaic materials”., *Chemistry Progress*, 2009, *21*, pp. 2303-2318.
 33. Jing Zhang, Yi Yang, Chang He, **Youjun He**, Guangjin Zhao and Yongfang Li*, “Solution-processable star-shaped photovoltaic organic molecule with triphenylamine core and benzothiadiazole-thiophene Arms”., *Macromolecules* 2009, *42*, pp. 7619-7622.
 34. **Youjun He**, Weiping Wu, Guangjin Zhao, Yunqi Liu*, Yongfang Li*, “Poly (3, 6-dihexyl-thieno [3, 2-b] thiophene vinylene): Synthesis, Field-Effect Transistors and Photovoltaic Properties”., *Macromolecules* 2008, *41*, pp. 9760-9766.

35. Haizheng Zhong, Yi Zhou, Mingfu Ye, **Youjun He**, Jianping Ye, Chang He, Chunhe Yang and Yongfang Li*, "Controlled synthesis and optical properties of colloidal ternary chalcogenide CuInS₂ nanocrystals", *Chem. Mater.*, 2008, 20, pp. 6434-6443.
36. Zhan'ao Tan, Rupei Tang, Erjun Zhou, **Youjun He**, Chunhe Yang, Fu Xi and Yongfang Li*, "Electroluminescence and photovoltaic properties of poly(*p*-phenylene vinylene) derivatives with dendritic pendants", *Journal of Applied Polymer Science* 2008, 107, pp. 514-521.
37. Zhan'ao Tan, Jianhui Hou, **Youjun He**, Erjun Zhou, Chunhe Yang, and Yongfang Li*, "Synthesis and photovoltaic properties of a donor-acceptor double-cable polythiophene with high content of C₆₀ pendant", *Macromolecules* 2007, 40, pp. 1868-1873.
38. Erjun Zhou, Zhan'ao Tan, **Youjun He**, Chunhe Yang and Yongfang Li*, "Synthesis, hole mobility, and photovoltaic properties of two alternating poly[3-(hex-1-enyl)thiophene-co-thiophene]s", *J. Polym. Sci. A: Polym. Chem.*, 2007, 45, pp. 629-638.
39. Erjun Zhou, Zhan'ao Tan, Lijun Huo, **Youjun He**, Chunhe Yang, and Yongfang Li*, "Effect of branched conjugation structure on the optical, electrochemical, hole mobility, and photovoltaic properties of polythiophenes", *J. Phys. Chem. B.*, 2006, 110, pp. 26062-26067.
40. Jianhui Hou, Zhan'ao Tan, **Youjun He**, Chunhe Yang, and Yongfang Li*, "Branched poly(thienylene vinylene)s with absorption spectra covering the whole visible region", *Macromolecules* 2006, 39, pp. 4657-4662.
41. Jianhui Hou, Zhan'ao Tan, Yong Yan, **Youjun He**, Chunhe Yang, and Yongfang Li*, "Synthesis and photovoltaic properties of two-dimensional conjugated polythiophenes with bi(thienylenevinylene) side chains", *J. Am. Chem. Soc.*, 2006, 128, pp. 4911-4916.

Patents application

- (1) **Youjun He**, Yongfang Li, "One kind of conjugated polymers with thieno[3,2-*b*]thiophene vinylene unit in the main chain, its synthesis method and application", Patent Application Number: CN200810106418.5, Patent Application Date: 04/18/2008.
- (2) **Youjun He**, Guangjin Zhao, Jie Min, Maojie Zhang, Yongfang Li, "One kind of fullerene acceptor derivatives, its synthesis methods and application", Patent Application Number: CN200910085130.9, Patent Application Date, 02/06/2009.
- (3) **Youjun He**, Guangjin Zhao, Maojie Zhang, Jie Min, Yongfang Li, "One kind of fullerene acceptor materials with indene unit, its synthesis methods and application", Patent Application Number: CN200910086711.4, Patent Application Date, 06/19/2009.
- (4) **Youjun He**, Guangjin Zhao, Yongfang Li, "One kind of fullerene derivative acceptor materials with indene unit, its synthesis methods and application", Patent Application Number: CN200910237889.4, Patent Application Date, 11/20/2009.