
Dr. Jian Liu (刘剑)

Postdoc

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RESEARCH TOPICS

Molecular doping of organic semiconductors; Organic/perovskite solar cells;
Organic thermoelectrics; Plastic plasmonic hydrogen sensor

EXPERIENCE

Organic Electronics Group, Department of Chemistry and Chemical Engineering, Chalmers University of Technology, Gothenburg, Sweden

Postdoctoral Researcher (*Advisor: Prof. Christian Müller*)

June 2020- now

- Plastic plasmonic hydrogen sensors

Photophysics and Optoelectronics research group, Zernike Institute for Advanced Materials, University of Groningen, The Netherlands - Research Guest (*Advisor: Prof. L. Jan Anton Koster*)

SEPTEMBER 2019 - April 2020

- Molecular doping of organic semiconductors and Organic thermoelectrics.

Photophysics and Optoelectronics research group, Zernike Institute for Advanced Materials, University of Groningen, The Netherlands - Postdoc (*Advisor: Prof. L. Jan Anton Koster*)

SEPTEMBER 2015 - SEPTEMBER 2019

- Molecular doping of organic semiconductors and Organic thermoelectrics.

Photophysics and Optoelectronics research group, Zernike Institute for Advanced Materials, University of Groningen, The Netherlands - Research Guest

JULY 2015 - SEPTEMBER 2015

- Molecular doping of organic semiconductors.

Department of electrical and electronic engineering, Hongkong University, Hong Kong - *Research associate (Advisor: Prof. Wallace C. H. Choy)*

NOVEMBER 2013 - July 2015

- Solution-processed organic/perovskite solar cells.
- Tandem solar cells.

Changchun Institute of Applied Chemistry, University of Chinese Academy, Changchun China - *Research assistant*

JULY 2013 - NOVEMBER 2013

- Solution-processed organic solar cells.

Changchun Institute of Applied Chemistry, University of Chinese Academy, Changchun China - *PhD (supervisor: Prof. Zhiyuan Xie)*

AUGUST 2008 - JULY 2013

Interface Engineering in Polymer Solar Cells

EDUCATION

Department of Chemistry, Huazhong University of Science and Technology, Wuhan, China - *Bachelor*

AWARDS

March 2013: 'Zhu Li Yue Hua' scholarship (朱李月华奖学金)

November 2012: National PhD scholarship (国家博士奖学金)

September 2012: 'Braun' scholarship (布劳恩奖学金)

2010-2012: 'Excellent Student' Title in CIAC. (中科院优秀毕业生)

2008-2012: CIAC Assistant Research Scholarship.

2008: 'Excellent graduate' Title in HUST. (华中大优秀毕业生)

2004-2007: HUST Winner of Excellent Student Scholarship. (华中大优秀学生)

SUPERVISION EXPERIENCE

Master student:

Bas van der Zee, (201709-201807) Thesis: "Studying fullerene derivatives for thermoelectrics through structural modification and doping".

Matt Garman, (201803-201902) Thesis: "Thermoelectric properties of n-type organic semiconductors".

Max Kamperman, (201809-201905) Thesis: “Impact of doping method and fullerene derivative side chain on performance of n-type thermoelectric materials”.

Bachelor student :

Jordan Townsend, (201904-201907) Thesis: “Exploring the effects of dielectric constants on n-type doping of fullerene derivatives”.

COLLABORATIONS

Prof. Maria Antonietta Loi, Prof. L. Jan Anton Koster, Dr. Giuseppe Portale, Zernike Institute of Advanced Materials; Prof. Jan C. Hummelen, Prof. Ryan C. Chiechi, Stratingh Institute for Chemistry; Prof. Siewert J. Marrink, Biomolecular Sciences and Biotechnology Institute, Groningen University, Netherlands

Prof. Derya Baran, King Abdullah University of Science and Technology (KAUST), Saudi Arabia.

Prof. Xugang Guo, Southern University of Science and Technology (SUSTech), China

Prof. Yanhou Geng, Prof. Yunfeng Deng, Tianjin University, China

Prof. Elizabeth von Hauff, Vrije University, Netherlands

Prof. Mario Caironi, Istituto Italiano di Tecnologia, Milano, Italy

PUBLICATION LIST (H index: 21; Google citation:1720)

<https://scholar.google.nl/citations?user=vx6pMkgAAAAJ&hl=en>

Web of science ResearchID: AAB-6915-2019

1. **Jian Liu,*** Matt P. Garman, Jingjin Dong, Bas van der Zee, Li Qiu, Giuseppe Portale, Jan C. Hummelen, and L. Jan Anton Koster*, Doping engineering enables highly conductive and thermally stable n-Type organic thermoelectrics with high power factor, **ACS Appl. Energy Mater.** 2019, 2, 6664-6671.
2. **Jian Liu***, Bas van der Zee, Riccardo Alessandri, Selim Sami, Jingjin Dong, Mohamad I. Nugraha, Alex J. Barker, Sylvia Rousseva, Li Qiu, Xinkai Qiu, Nathalie Klasen, Ryan C. Chiechi, Derya Baran, Mario Caironi, Giuseppe Portale, Remco W. A. Havenith, Siewert J. Marrink, Jan C. Hummelen, and L. Jan Anton Koster,* The phonon-glass electron-crystal concept in n-type organic thermoelectrics: demonstration of $ZT > 0.3$, **Nature Communication**, 2020, **Revised**.

3. **Jian Liu***, Gang Ye, Mohamad Insan Nugraha, Diego Rosasvillava, Jingjin Dong, Giuseppe Portale, Derya Baran, Thomas D. Anthopoulos, Ryan C. Chiechi*, and L. Jan Anton Koster*, Amphipathic Side Chain of Conjugated Polymer Optimizes Dopant Location Toward Efficient N-type Organic Thermoelectrics, **Adv. Mater.**, 2020, **Revised**.
4. **Jian Liu***, Sudeshna Maity, Nathan Roosloot, Xinkai Qiu, Li Qiu, Ryan C. Chiechi, Jan C. Hummelen, Elizabeth von Hauff, and L. Jan Anton Koster*, The Effect of Electrostatic Interaction on n-Type Doping Efficiency of Fullerene Derivatives, **Adv. Electron. Mater.** 2019, DOI: **10.1002/aelm.201800959** (invited paper) (IF=6.31) (1区)
5. **Jian Liu***, Yongqiang Shi, Jingjin Dong, M. Nugraha, Xinkai Qiu, Mengyao Su, Ryan C. Chiechi, D. Baran, Giuseppe Portale, Xugang Guo,* and L. Jan Anton Koster*, **ACS Energy Letter**, 2019, 4, 1556. (IF=16.33) (1区)
6. **Jian Liu***, Li Qiu, Giuseppe Portale, Solmaz Torabi, Marc C. A. Stuart, Xinkai Qiu, Marten Koopmans, Ryan C. Chiechi, Jan C. Hummelen, and L. Jan Anton Koster*, Side-chain effects on N-type organic thermoelectrics: A case study of fullerene derivatives, **Nano Energy**, 2018, 52, 183. (IF=15.55) (1区)
7. **Jian Liu,*#** Gang Ye,# Bas van der Zee, Jingjin Dong, Xinkai Qiu, Yuru Liu, Giuseppe Portale, Ryan C. Chiechi, and L. Jan Anton Koster*, N-Type Organic Thermoelectrics of Donor–Acceptor Copolymers: Improved Power Factor by Molecular Tailoring of the Density of States, **Adv. Mater.** 2018, 30, 1804290. (# contribute equally) (IF=25.81) (1区)
8. **Jian Liu,*#** Li Qiu,# Riccardo Alessandri, Xinkai Qiu, Giuseppe Portale, Jingjin Dong, Wytse Talsma, Gang Ye, Aprizal Akbar Sengrian, Paulo C. T. Souza, Maria Antonietta Loi, Ryan C. Chiechi, Siewert J. Marrink, Jan C. Hummelen, and L. Jan Anton Koster, Enhancing molecular n-type doping of donor-acceptor copolymers by tailoring side chains, **Adv. Mater.** 2018, 30, 1704630. (# contribute equally) (IF=25.81) (1区)
9. Li Qiu,# **Jian Liu**,# Riccardo Alessandri, Xinkai Qiu, Marten Koopmans, Remco W. A. Havenith, Siewert J. Marrink, Ryan C. Chiechi, L. Jan Anton Koster, and Jan C. Hummelen, Enhancing doping efficiency by improving host- dopant miscibility for fullerene-based n-type thermoelectrics, **J. Mater. Chem. A**, 2017, 5, 21234. (# contribute equally) (IF=10.73) (1区)
10. **Jian Liu**, Li Qiu, Giuseppe Portale, Marten Koopmans, Gert ten Brink, Jan C. Hummelen, and L. Jan Anton Koster, N-Type Organic Thermoelectrics: Improved Power Factor by Tailoring Host–Dopant Miscibility, **Adv. Mater.** 2017, 29, 1701641. (IF=25.81) (1区)
11. Shuyan Shao, **Jian Liu**, Giuseppe Portale, Honghua Fang, Graeme Blake, Gert ten Brink, L. Jan Anton Koster, Maria Antonietta Loi, Highly Reproducible Sn-Based Hybrid Perovskite Solar Cells with 9% Efficiency, **Adv. Energy Mater.** 2017, 1702019. (IF=24.88)

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12. Shuyan Shao, **Jian Liu**, Hong-hua Fang, Li Qiu, Gert ten Brink, Jan C. Hummelen, L. Jan Anton Koster, Maria Antonietta Loi, Efficient Perovskite Solar Cells over a Broad Temperature Window: The Role of the Charge Carrier Extraction, **Adv. Energy Mater.** **2017**, 1701305. **(IF=24.88)**
 13. Shuyan Shao, Mustapha Abdu-Aguye, Li Qiu, Lai-Hung Lai, **Jian Liu**, Sampson Adjokatse, Fatemeh Jahani, Machteld E. Kamminga, Gert ten Brink, Thomas T. M. Palstra, Jan C. Hummelen, Maria Antonietta Loi, Elimination of the light soaking effect and performance enhancement in perovskite solar cells using a fullerene derivative, **Energy & Environ. Sci.** **2016**, 9, 2444-2452. **(IF=33.25)**
 14. Solmaz Torabi, **Jian Liu**, Pavlo Gordiichuk, Andreas Herrmann, Li Qiu, Fatemeh Jahani, Jan C. Hummelen, and L. Jan Anton Koster, Deposition of LiF onto Films of Fullerene Derivatives Leads to Bulk Doping, **ACS App. Mater. Interfaces**, **2016**, 8, 22623. **(IF=8.46)**
 15. Shunmian Lu, Xing Guan, Xinchun Li, **Jian Liu**, Fei Huang, Wallace C.H. Choy, The incorporation of thermionic emission and work function tuning layer into intermediate connecting layer for high performance tandem organic solar cells, **Nano Energy**, **2016**, 21, 123. **(IF=15.55)**
 16. **Jian Liu**,# Shunmian Lu,# Lu Zhu, Xinchun Li, Wallace C.H. Choy, Perovskite-organic hybrid tandem solar cells using a nanostructured perovskite layer as the light window and a PFN/doped-MoO₃/MoO₃ multilayer as the interconnecting layer, **Nanoscale**, **2016**, 8, 3638. (# contribute equally) **(IF=6.97)** **(1区)**
 17. **Jian Liu**,# Xinchun Li,# Shaoqing Zhang, Xingang Ren, Jiaqi Cheng, Lu Zhu, Di Zhang, Lijun Huo, Jianhui Hou, Wallace C. H. Choy, Synergic Effects of Randomly Aligned SWCNT Mesh and Self-Assembled Molecule Layer for High-Performance, Low-Bandgap, Polymer Solar Cells with Fast Charge Extraction, **Adv. Mater. Interfaces**, **2015**, 2, 1500324. (# contribute equally) **(IF=4.71)** **(2区)**
 18. Mei-Feng Xu, Hong Zhang, Su Zhang, Lu Zhu, Huimin Su, **Jian Liu**, Kam Sing Wong, Ls Liao, Wallace C. H. Choy, A low temperature gradual annealing scheme for achieving high performance perovskite solar cells with no hysteresis, **J. Mater. Chem. A**, **2015**, 3, 14424. **(IF=10.73)**
 19. Haifei Lu, Di Zhang, Jiaqi Cheng, **Jian Liu**, Jian Mao, Wallace C. H. Choy, Locally Welded Silver Nano-Network Transparent Electrodes with High Operational Stability by a Simple Alcohol-Based Chemical Approach, **Adv. Funct. Mater.** **2015**, 25, 4211. **(IF=15.62)**
 20. Haifei Lu, Di Zhang, Jiaqi Cheng, **Jian Liu**, Jian Mao, Wallace C. H. Choy, Selective Growth and Integration of Silver Nanoparticles on Silver Nanowires at Room Conditions for Transparent Nano-Network Electrode, **ACS Nano**, **2014**, 8, 10980. **(IF=13.9)**
 21. Yunfeng Deng, **Jian Liu**, Jiantai Wang, Lihui Liu, Weili Li, Hongkun Tian, Xiaojie Zhang, Zhiyuan Xie, Yanhou Geng, Fosong Wang, Dithienocarbazole and Isoindigo based Amorphous Low

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- Bandgap Conjugated Polymers for Efficient Polymer Solar Cells, *Adv. Mater.* **2014**, 26, 471. (IF=25.81)
22. Ze Zhong, Jian Liu, Zhiyuan Xie, Zhiyuan Wang, Significant Efficiency Enhancement of Bulk Heterojunction Organic Photovoltaics Using Solution-Processable Interfacial Bilayers, *ChemElectroChem*, **2014**, 1, 471. (IF=4.14)
23. Jian Liu, Jiang Wu, Shuyan Shao, Zhiyuan Xie, Shijie Guo, Nanoscale Phase Separation-Induced Suppression of Geminate Recombination in Low Bandgap Polymer-Fullerene Solar Cells, *Chinese Physics Letters*, **2014**, 31, 58801. (IF=1.07)
24. Jian Liu, Jiang Wu, Shuyan Shao, Yunfeng Deng, Bin Meng, Zhiyuan Xie, Yanhou Geng, Lixiang Wang, Fengling Zhang, Printable highly conductive conjugated polymer sensitized ZnO NCs as cathode interfacial layer for efficient polymer solar cells, *ACS Appl. Mater. Interface*, **2014**, 6, 8237. (IF=8.46) (1区)
25. Jian Liu, Shuyan Shao, Gang Fang, Jiantai Wang, Bin Meng, Zhiyuan Xie, Lixiang Wang, High-efficiency inverted tandem polymer solar cells with step-Al-doped MoO₃ interconnection layer, *Sol. Energy Mater. Sol. Cells*, **2014**, 120, 744. (IF=6.02) (1区)
26. Yunfeng Deng, Yagang Chen, Jian Liu, Lihui Liu, Hongkun Tian, Zhiyuan Xie, Yanhou Geng, Fosong Wang, Low-Band-Gap Conjugated Polymers of Dithieno[2,3-*b*:7,6-*b'*]carbazole and Diketopyrrolopyrrole: Effect of Alkyl Side Chain on Photovoltaic Properties, *ACS Appl. Mater. Interfaces*, **2013**, 5, 5741-5747. (IF=8.46)
27. Jianfei Qu, Jian Liu, Sida Li, Zhiyuan Xie, Yanhou Geng, Donor-acceptor conjugated cooligomers for single molecule solar cells, *Chinese Journal of Polymer Science*, **2013**, 31, 815. (IF=2.02)
28. Pengcheng Li, Hui Tong, Jian Liu, Junqiao Ding, Zhiyuan Xie, Lixiang Wang, An A' -A-D-A-A' type small molecule based on 2, 7-carbazole for solution-processed organic solar cells with high open-circuit voltage, *RSC Adv*, **2013**, 3, 23098. (IF=3.05)
29. Shuyan Shao, Jian Liu, Jonas Bergqvist, Shengwei Shi, Clemens Veit, Uli Würfel, Zhiyuan Xie, Fengling Zhang, In Situ Formation of MoO₃ in PEDOT:PSS Matrix: A Facile Way to Produce a Smooth and Less Hygroscopic Hole Transport Layer for Highly Stable Polymer Bulk Heterojunction Solar Cells, *Adv. Energy Mater.* **2013**, 3, 349-355. (IF=24.88)
30. Jian Liu, Shuyan Shao, Gang Fang, Bin Meng, Zhiyuan Xie, Lixiang Wang, High-Efficiency Inverted Polymer Solar Cells with Transparent and Work-Function Tunable MoO₃-Al Composite Film as Cathode Buffer Layer, *Adv. Mater.* **2012**, 24, 2774. (IF=25.88) (1区)
31. Jian Liu, Shuyan Shao, Bin meng, Gang Fang, Zhiyuan Xie, Lixiang Wang, Xinglin Li, Enhancement of inverted polymer solar cells with

solution-processed ZnO-TiO_x composite as cathode buffer layer, *Appl. Phys. Lett.* **2012**, 100,213906. (IF=3.52) (2区)

32. Shuyan Shao, Jian Liu, Jidong Zhang, Baohua Zhang, Zhiyuan Xie, Lixiang Wang, Interface-induced crystalline ordering and favorable morphology for efficient annealing-free poly (3-hexylthiophene): fullerene derivative solar cells, *ACS Appl. Mater. Interface*, **2012**, 4, 5704-5710. (IF=8.46)
33. Gang Fang, Jian Liu, Yingying Fu, Bin Meng, Baohua Zhang, Zhiyuan Xie, Lixiang Wang, Improving the nanoscale morphology and processibility for PCDTBT-based polymer solar cells via solvent mixtures, *Org. Electron.* **2012**, 13, 2733-2740. (IF=3.68)
34. Shuyan Shao, Jian Liu, Baohua Zhang, Zhiyuan Xie and Lixiang Wang, Enhanced stability of zinc oxide-based hybrid polymer solar cells by manipulating ultraviolet light distribution in the active layer, *Appl. Phys. Lett.* **2011**, 98, 203304. (IF=3.52)

CONFERENCE

- (1) J. Liu (Presenting Author), B. Zee, J. J. Dong, L. Qiu, G. Portale, J. C. Hummelen, and L. J. A. Koster, Improved molecular order and conductivity in fullerene derivatives by tailoring the side chain, Materials Research Society (MRS) Spring Meeting, April 22-26, Phoenix, 2019 (talk)
- (2) J. Liu (Presenting Author), L. Qiu, J. C. Hummelen, L. J. A. Koster, N-Type Organic Thermoelectrics-Improved Power Factor by Tailoring Host-Dopant Miscibility, Materials Research Society (MRS) Fall Meeting, November 27-December 2, Boston, 2016 (talk)
- (3) J. Liu (Presenting Author), L. Qiu, J. C. Hummelen, L. J. A. Koster, Enhanced Host-dopant miscibility for n-type doping towards organic thermoelectric application, CMD 26 Conference, September 4th-9th, Groningen, 2016 (talk)
- (4) J. Liu (Presenting Author), S. Shao, M. A. Loi, and L. J. A. Koster, Charge transport in FASnI₃ layer with vacancy control, Next-Gen III: PV materials, 2-5 July, 2017, Groningen, Netherlands. (Poster)
- (5) J. Liu, Shuyan Shao, Jiang Wu, Yunfeng Deng, Yanhou Geng, zhiyuan Xie, Efficient polymer solar cells with printable inorganic/organic semiconductor hybrid materials as electron-transporting layer (poster), The 11th China-Japan Joint Symposium on Conduction and Photoconduction in Organic Solids and Related Phenomena, Sept. 1-4, 2013, Changchun, China. (poster)

