

# Jingchuan Wang

## Personal Information

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## Work Experience

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Postdoc, Institute of Physics, Chinese Academy of Sciences 2013.1-current

Research project: Ultrafast charge injection dynamics at molecular level by using STM assisted by pump-probe system; water behavior under electric field; and novel perovskite based hybrid organic-DSSC;

## Education

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<i>Institution</i>	<i>Department</i>	<i>Degree</i>	<i>Year</i>
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The Hong Kong Polytechnic University, Hong Kong	Mechanical Engineering	Ph.D	2009-2012
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Research topic: *Broadening Light Absorption and Enhancing Exciton Diffusion Length for Organic Solar Cells*

General Research Institute for Nonferrous Metals, Beijing, China	Material Science	M.S.	2006-2009
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Research topic: *Enhancing the dehydrogenation Kinetics of Li-Mg-N-H Hydrogen Storage materials*

Harbin Institute of Technology, Harbin, China	Materials Science and Engineering	B.Sc.	2002-2006
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## Research Interests

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1. Large area organic solar cells on the flexible transparent substrate such as PET or PEN, with acceptable low-cost fabrication processes such as ink-printing and roll-to-roll in the air condition;
2. Transparent conductive electrode combining the metal or CNT nano-grids with the micro-scale graphene layers which can be seen as borrowing the idea from composite materials. The physical properties of this combining TCE such as work function and surface plasma effect can be tuned for matching the organic active absorbing layers;
3. Focus on charge transfer dynamics at molecular level, which intends to give insight into the fundamental electronic processes for organic electronics, taking the photo-assisted STM as a major tool to research such an ultrafast dynamics.

My Ph.D research project mainly focuses on both experimental and theoretical studies of

charge transfer mechanisms, band structure engineering, and interfacial modifications in organic solar cells. My work included:

1. Intensive investigation the mechanisms of causing the “S-shape” effect in the J-V curves of small molecule organic solar cells by both experimental and numerical studies;
2. Demonstrate and investigate the use of multi-junctions design in OPV for power conversion efficiency enhancement, the main principle behind is to enhance optical absorption of the solar cells without scarifying the charge transport efficiency;
3. New solution growth method for the crystallized SubPc organic semiconductor thin film and its characterization including exciton diffusion length, crystalline structure, PL spectrum and etc.

## Skills

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### *Fabrication and characterization skills for electronic devices*

Thermal evaporation chamber, spin coating machine, electro-spinning, grazing incidence X-ray diffraction (GIXRD), scanning electron microscope (SEM), electron transmission microscope (TEM), atomic force microscope (AFM), Photo-assisted STM, FT-IR and Ramen spectroscopy, photoluminescence, I-V and C-V measurement and CCD-based thermorefectance.

### *Fabrication and characterization skills for hydrogen storage materials*

Dynamics and kinetics characterization for hydrogen storage materials (including alloys and light weight  $\text{LiNH}_2$ ,  $\text{MgH}_2$ , etc active materials), TG-DSC for thermal analysis, glove-box handle, high energy mixer for alloy preparation.

### *Numerical programming and graph plotting skills*

MatLAB, COMSOL and AMPS for photovoltaic simulation

### *Ultrahigh vacuum system operation and cryogenic stage*

Low temperature Scanning tunneling microscope (STM), Transition absorption measurement with pump-probe system (a little)

## Publications

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1. **J.C. Wang**, S.Q. Shi, C.W. Leung and P.K.L. Chan, “*Enhancing of exciton diffusion length in crystallized Boron Subphthalocyanine Chloride thin film grown on negatively charged surface of electrode*”(submitted)
  2. **J.C. Wang**, S.Q. Shi, C.W. Leung, S.P. Lau, K.Y. Wong and P.K.L. Chan, “*Short circuit current improvement in planar heterojunction organic solar cells by multijunction charge transfer*”, Applied Physics Letters, 100, 053301, 2012.
  3. **J.C. Wang**, X. C. Ren, S.Q. Shi, C.W. Leung, Paddy K. L. Chan, “*Charge accumulation induced S-shape J-V curves in bilayer heterojunction organic solar cells*”, Organic Electronics, 12, pp.880~885, 2011. ( **was selected as the No.1 hottest paper of the season at O.E and was highly cited in Engineering**” by

**Thomson Reuters in 2013)**

4. **J.C. Wang**, H. L. Li, S. M. Wang, X.P. Liu, Y. Li L. J. Jiang “*The desorption kinetics of the Mg(NH<sub>2</sub>)<sub>2</sub>LiH mixture*” Int. J. Hydrogen Energy 34, 1412 (2009)1411–1416
5. **J.C. Wang**, Z.N Li, H.L Li, etc. “ Enhancement of Ti-Cr-V BCC alloys on the dehydrating kinetics of Li-Mg-N-H hydrogen storage materials”, Rare Metals, 2010(29)621
6. Lijun Yang, Wallace Woon-Fong Leung and **Jingchuan Wang**. “ Improvement of Light Harvesting in Dye Sensitized Solar Cell Based on Cascade Charge Transfer”, Nanoscale. DOI: 10.1039/ c3nr01868g
7. F. Zhang, F. Shi, W. Ma, F. Gao, Y. Jiao, H. Li, **J.C. Wang**, X.Y Shan, X.H. Lu, and S. Meng. “Controlling Adsorption Structure of Eosin Y Dye on Nanocrystalline TiO<sub>2</sub> Films for Improved Photovoltaic Performances” The Journal of Physical Chemistry C (Accepted)
8. Enna Ha, Lawrence Yoon Suk Lee, **Jingchuan Wang**, Fenghua Li and Kowk-yin Wong. “Synthesis and Electrocatalytic Property of Au/Cu<sub>2</sub>ZnSnS<sub>4</sub> Core Shell Hybrid Nanostructure”. The Journal of Physical Chemistry C (revised)

**Chinese patents:**

1. 王劲川, 李华玲, 王树茂等, 改善 Li-Mg-N-H 体系储氢材料放氢动力学的催化剂及其使用方法。专利号: CN200810116492.5
2. 宫会期, 王劲川, 孙丽欢, 董立, 颜世超, 谢楠, 单欣岩, 郭阳, 陆兴华. 一种扫描隧道显微镜扫描头。专利申请号:201310163003.2

**Conference presentations:**

J. C. Wang, S. Q. Shi, C. W. Leung and P. K. L. Chan, “*Short circuit current improvement in planar heterojunction organic solar cells by multijunction charge transfer*”, MRS Fall 2011, Boston, MA, 2011.

J. C. Wang, X. C. Ren, S. Q. Shi, C. W. Leung and P. K. L. Chan, “*S-shape properties in the J-V curves of bilayer heterojunction organic solar cells*”, MRS Fall 2010, Boston, MA, 2010.

J. C. Wang, Paddy K. L. Chan, and S. Q. Shi “ Light absorption broadening and exciton diffusion length improving for organic solar cells” The 2ed USTC-POLYU-SICCAS Joint Workshop on Advanced Materials for Energy Conversion. 2012