

Shihe YANG

Professor (Director of Guangdong Provincial Key Laboratory on Nano- and Micro-scale Materials Research), Peking University Shenzhen Graduate School, SHENZHEN

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Associate Director, Materials Characterization and Preparation Facility, HKUST, HONG KONG

Education: B.Sc., Zhongshan University, 1982; Ph.D (Phys Chem), Rice University, 1988

Academic Positions:

Professor (Director of Guangdong Provincial Key Laboratory on Nano- and Micro-scale materials Research), Peking University Shenzhen, 2017-present; Associate Director, Materials Characterization and Preparation Facility, HKUST, 2016-present; Professor, HKUST, 2005-present; Associate Professor, HKUST, 1999-2005; Assistant Professor, HKUST, 1992-98; Research Associate, Univ. of Toronto (with John Polanyi, Nobel Laureate), 1989-92; Post-doc. Fellow, Argonne National Lab. (Cluster Group), 1988-89; Research Assistant, Rice Univ. (with Richard Smalley, Nobel Laureate), 1983-88

Research Summary

Interest: Structure, dynamics, and photochemistry of clusters (1993-2005); Fullerene/Metallofullerene derivatives (1995-present); Nanoscale materials physical chemistry (1998-present); Soft molecular interfacial phenomena (2003-present); Energy generation/conversion/storage and the underlying physical chemistry (2003-present).

Scholarship: 1 edited book; > 550 academic research articles (18 before joining HKUST) published in reputed academic journals with >36000 citations (h index 100); ~15 technical patents; > 75 research grants awarded; ~220 invited lectures including plenary and keynote lectures in international research conferences.

Journal Reviewer: Referee for Nature Series Journals, Science Series Journals, J. Am. Chem. Soc., Angew Chem., Int. Ed., Nano Letters, Adv. Mater., ACS Nano, Energy Environ. Sci., Chem. Mater., Acc. Chem. Res., Chem. Rev., etc.

Awards and Honors

Functional Materials Scientist Award in recognition of excellent research performance in the field of functional materials, the 4th International Symposium on Rare Earth Resource (ISRERU-4) and the 7th International Symposium on Functional Materials (ISFM-7), August 18, 2016.

Guangdong Province Science and Technology Prize, Second Class, “Controllable Synthesis and Structures of Nanomaterials and Their Applications in Energy Conversion”, 2017

Oversea Evaluation Expert, Chinese Academy of Sciences, 2015

State Natural Science Award, Second Class, “Structural and physical mechanism investigation of giant electrorheological fluid”, January, 2015

National Qian Ren Ji Hua (A) elected in 2015, Chinese Academy of Sciences

State Natural Science Award, Second Class, “Bottom-up engineering and properties of nano-structures of transition metals and their oxides and compounds”, January, 2014

Ministry of Education Award for Research Excellence in Natural Science, First Class, “Bottom-up engineering and properties of nano-structures of transition metals and their oxides and compounds”, January, 2011

Visiting Chang Jiang Chair Professor, Beijing University of Aeronautics and Astronautics, March 2008 - March 2011

Anhui Province Science and Technology Prize, Second Class, “In-situ preparation and characterization of one-dimensional nanowires arrays”, 2008

Guangdong Province Science and Technology Prize, First Class, “Preparation of nanoemitter cold-cathodes and their device application”, 2007

NSFC Young Investigator Award, 2004-2006

Wong Kuan Cheng Education Foundation Academic Exchange Award, Wuhan Institute of Physics and Mathematics, 1999

Robert A. Welch predoctoral fellowship, Rice University, 1985-1988

CGP postgraduate student fellowship, The Ministry of Education of China, Rice University, 1983-1984

Outstanding student award, Zhongshan University, Guangzhou, 1981

Editorial Board Member

Editorial Advisory Board Member of *ACS Applied Materials & Interfaces (ACS-AMI)*, American Chemical Society (2019 - present)

Editorial Advisory Board Member of *ACTA CHIMICA SINICA* 《化学学报》, Chinese Chemical Society (中国化学会, 2018 - present)

Editorial Advisory Board Member of *ChemNanoMat*, Asian Chemical Editorial Society (ACES) and Wiley-VCH, Germany (2014 - present)

Editorial Advisory Board Member of *Frontiers of Optoelectronics* (Energy Photonics), Springer (2013 - present)

Editorial Advisory Board Member of *International Journal of Nanotechnology*, Inderscience Enterprises Ltd., Switzerland (2003 - present)

Editorial Advisory Board Member of *Chinese Journal of Chemical Physics*, Chinese Physical Society Science Press, China (2006 - present)

Editorial Advisory Board Member to the *Open Condensed Matter Physics Journals*, Bentham Science Publishers Ltd. (2007 - present).

Advisory Board Member of the Journal entitled “*Reviews in Advanced Sciences and Engineering*” (www.aspbs.com/rase) published by the American Scientific Publishers based in USA (2011 - present).

Editorial Advisory Board Member of the Journal 《可持续能源》, *Sustainable Energy*, Hans Publishers, (2011 - present).

Representative Publications:

- 1 “Solution grown single-unit-cell quantum wires affording self-powered solar-blind UV photodetectors with ultrahigh selectivity and sensitivity”. Dong Li, Simeng Hao, Guanjie Xing, Yunchao Li, Xiaohong Li, Louzhen Fan, **Shihe Yang**, *J. Am. Chem. Soc.*, xx(xx), xxx-xxx (2019).
- 2 “Towards Efficient Charge Collection and Light Absorption: A Perspective of Light Trapping for Advanced Photoelectrodes”. Weitao Qiu, Shuang Xiao, Yexiang Tong, Shihe Yang, *J. Phys. Chem. C, Feature Article*, x(x), xx-xx (2019).

- 3 "Excess Cesium Iodide Induces Spinodal Decomposition of CsPbI₂Br Perovskite Films". Xiangyue Meng, Zheng Wang, Wei Qian, Zonglong Zhu, Teng Zhang, Yang Bai, Chen Hu, Shuang Xiao, Yinglong Yang, **Shihe Yang**, *J. Phys. Chem. Lett.*, **10(2)**, 194-199 (2019).
- 4 "Three-Dimensional Decoupling Co-catalyst from Photo-absorbing Semiconductor as a New Strategy to Boost Photoelectrochemical Water Splitting". He Lin, Xia Long, Yiming An, Dan Zhou, Shihe Yang, *Nano Letters*, **19(1)**, 455-460 (2019).
- 5 "An Ultrathin Ferroelectric Perovskite Oxide Layer for High-performance Hole-Transport-Material-free Carbon-based Halide Perovskite Solar Cells". Yinglong Yang, Zhenghao Liu, Wai Kit Ng, Lihua Zhang, Hua Zhang, Xiangyue Meng, Yang Bai, Shuang Xiao, Teng Zhang, Chen Hu, Kam Sing Wong, Shihe Yang, *Adv. Functional Mater.*, **29(1)**, Article Number: 1806506 (2019).
- 6 "Versatility of carbon enables all carbon based perovskite solar cells to achieve high efficiency and high stability". Xiangyue Meng, Junshuai Zhou, Jie Hou, Yingchu Chen, Xia Tao, **Shihe Yang**, *Adv. Mater.*, **30(21)**, Article Number: 1706975 (2018).
- 7 "Engineering triangular carbon quantum dots with unprecedented narrow bandwidth emission for multicolored LEDs". Fanglong Yuan, Ting Yuan, Laizhi Sui, Zhibin Wang, Zifan Xi, Yunchao Li, Xiaohong Li, Louzhen Fan, Zhan'ao Tan, Anmin Chen, Mingxing Jin, Shihe Yang, *Nature Communications*, **9**, Article number: 2249 (2018).
- 8 "Ultrathin amorphous cobalt–vanadium hydr(oxy)oxide catalysts for the oxygen evolution reaction". Juzhe Liu, Yongfei Ji, Jianwei Nai, Xiaogang Niu, Yi Luo, Lin Guo, Shihe Yang, *Energy & Environmental Science*, **11(7)**, 1736-1741 (2018).
- 9 "53% Efficient Red Emissive Carbon Quantum Dots for High Color Rendering and Stable Warm White-Light-Emitting Diodes". Zifei Wang, Fanglong Yuan, Xiaohong Li, Yunchao Li, Haizheng Zhong, Louzhen Fan, **Shihe Yang**, *Adv. Mater.*, **29(37)**, Article Number: 1702910 (2017).
- 10 "Carbon-Based Hole Transport Materials-Free Perovskite Solar Cells: The Front Runner to the Market?". Haining Chen, **Shihe Yang**, *Adv. Mater.*, **29(24)**, 1603994 (2017).
- 11 "Carbon quantum dots as a visible light sensitizer to significantly boost the solar water splitting performance of bismuth vanadate photoanodes". Kai-Hang Ye, Zilong Wang, Jiuwang Gu, Shuang Xiao, Yufei Yuan, Yi Zhu, Yuanming Zhang, Wenjie Maia, **Shihe Yang**, *Energy & Environmental Science*, **10(3)**, 772-779 (2017).
- 12 "Engineering stepped edge surface structures of MoS₂ sheet stacks to accelerate the hydrogen evolution reaction". Jue Hu, Bolong Huang, Chengxu Zhang, Zilong Wang, Yiming An, Dan Zhou, He Lin, Michael K. H. Leung, **Shihe Yang**, *Energy & Environmental Science*, **10(2)**, 593-603 (2017).
- 13 "Dual-doped MoO₃ Nanowires: Bifunctional Anodes for Fiber-shaped Asymmetric Supercapacitors and Microbial Fuel Cells". Minghao Yu, Xinyu Cheng, Yinxiang Zeng, Zilong Wang, Yexiang Tong, Xihong Lu, **Shihe Yang**, *Angew. Chem., Int. Ed.*, **55(23)**, 6762-6766 (2016).
- 14 "Understanding the Relationship between Ion Migration and the Anomalous Hysteresis in High-Efficiency Perovskite Solar Cells: A Fresh Perspective from Halide Substitution". Teng Zhang, Haining Chen, Yang Bai, Shuang Xiao, Lei Zhu, Chen Hu, Qingzhong Xue, **Shihe Yang**, *Nano Energy*, **26**, 620-630 (2016)

- 15 "Solvent Engineering Boosts the Efficiency of Paintable Carbon-based Perovskite Solar Cells to Beyond 14 %". Haining Chen, Zhanhua Wei, Hexiang He, Xiaoli Zheng, Kam Sing Wong, **Shihe Yang**, *Adv. Energy Mater.*, **6**, Article Number: 1502087 (2016).
- 16 "Effects of a molecular monolayer modification of NiO nanocrystal layer surfaces on perovskite crystallization and interface contact towards faster hole extraction and higher photovoltaic performance". Yang Bai, Haining Chen, Shuang Xiao, Qifan Xue, Teng Zhang, Zonglong Zhu, Qiang Li, Chen Hu, Yun Yang, Zhicheng Hu, Fei Huang, Kam Sing Wong, Hin-Lap Yip, **Shihe Yang**, *Adv. Functional Mater.*, **26**, 2950-2958 (2016).
- 17 "Transition Metal Based Layered Double Hydroxides Tailored for Energy Conversion and Storage". Xia Long, Zilong Wang, Shuang Xiao, Yiming An, **Shihe Yang**, *Materials Today*, **19**, 213-226 (2016).
- 18 "Hybrid Halide Perovskite Solar Cell Precursors: Colloidal Chemistry and Coordination Engineering behind Device Processing for High Efficiency". Keyou Yan, Mingzhu Long, Tiankai Zhang, Zhanhua Wei, Haining Chen, **Shihe Yang**, Jianbin Xu, *J. Am. Chem. Soc.*, **137**, 4460-4468 (2015).
- 19 "Metallic Iron-Nickel Sulfide Ultrathin Nanosheets As a Highly Active Electrocatalyst for Hydrogen Evolution Reaction in Acidic Media". Xia Long, Guixia Li, Zilong Wang, Houyu Zhu, Teng Zhang, Shuang Xiao, Wenyue Guo, Shihe Yang, *J. Am. Chem. Soc.*, **137**, 11900-11903 (2015).
- 20 "Efficiency Enhancement of Perovskite Solar Cells through Fast Electron Extraction: the Role of Graphene Quantum Dots". Zonglong Zhu, Jiani Ma, Zilong Wang, Cheng Mu, Zetan Fan, Lili Du, Yang Bai, Louzhen Fan, He Yan, David Lee Phillips, **Shihe Yang**, *J. Am. Chem. Soc.*, **136**, 3760-3763 (2014).
- 21 "Strongly Coupled Graphene and FeNi Double Hydroxide Hybrid as an Excellent Electrocatalyst for Oxygen Evolution Reaction". Xia Long, Jinkai Li, Shuang Xiao, Keyou Yan, Zilong Wang, Haining Chen, **Shihe Yang**, *Angew. Chem., Int. Ed.*, **53**, 7584-7588 (2014).
- 22 "Space-Confined Growth of MoS₂ Nanosheets within Graphite: The Layered Hybrid of MoS₂ and Graphene as an Active Catalyst for Hydrogen Evolution Reaction", Xiaoli Zheng, Jianbo Xu, Keyou Yan, Hong Wang, Zilong Wang, **Shihe Yang**, *Chem. Mater.* **26**, 2344 (2014).
- 23 "High-Rate, Ultra-Long Cycle-Life Lithium/Sulfur Batteries enabled by Nitrogen-doped Graphene". Yongcai Qiu, Wanfei Li, Guizhu Li, Yuan Hou, Meinan Liu, Lisha Zhou, Fangmin Ye, Hongfei Li, Zhanhua Wei, **Shihe Yang**, Wen Zhao, Wenhui Duan, Yifan Ye, Jinghua Guo, Yuegang Zhang, *Nano Letters*, **14**, 4821-4827 (2014).
- 24 "A Quasi-Quantum Well Sensitized Solar Cell with Accelerated Charge Separation and Collection". Keyou Yan, Lixia Zhang, Jianhang Qiu, Yongcai Qiu, Zonglong Zhu, Jiannong Wang, **Shihe Yang**, *J. Am. Chem. Soc.* **135**, 9531 (2013).
- 25 "Secondary Branching and Nitrogen Doping of ZnO Nanotetrapods: Building a Highly Active Network for Photoelectrochemical Water Splitting", Yongcai Qiu, Keyou Yan, Hong Deng, **Shihe Yang**, *Nano Letters* **12**, 407-413 (2012).

- 26 "A Double-layered Photoanode Made of TiO₂ Nanooctahedra and Agglutinate Mesoporous TiO₂ Microspheres for High Efficiency Dye Sensitized Solar Cell", Keyou Yan, Yongcai Qiu, Wei Chen, Min Zhang, **Shihe Yang**, *Energy & Environmental Science* **4**, 2168 (2011).
- 27 "In-Situ Fabrication of Inorganic Nanowire Arrays Grown from and Aligned on Metal Substrates", Weixin Zhang, **Shihe Yang**, *Accounts of Chem. Res.* **42**, 1617-1627 (2009).
- 28 "Controlled Synthesis and Upconverted Avalanche Luminescence of Ce(III) and Nd(III) Orthovanadate Nanocrystals with High Uniformity of Size and Shape". Hong Deng, **Shihe Yang**, Si Xiao, Hong-Mei Gong, Qu-Quan Wang, *J. Am. Chem. Soc.* **130**, 2032-2040 (2008).
- 29 "Detecting atomically site-specific mechanical responses from individual metallofullerene molecules confined inside carbon nanotubes". Makoto Ashino, Dirk Obergfell, Miro Haluska, **Shihe Yang**, Andrei N. Khlobystov, Siegmur Roth, Roland Wiesendanger, *Nature Nanotech.*, **3**, 337-341 (2008).
- 30 "Synthesis of a Dy@C₈₂ Derivative Bearing a Single Phosphorus Substituent via a Zwitterion Approach". Xiaofang Li, Louzhen Fan, Dongfang Liu, Herman H. Y. Sung, Ian D. Williams, **Shihe Yang**, Kai Tan, Xin Lu, *J. Am. Chem. Soc.*, **129**, 10636-10637 (2007).
- 31 "Hollow and Sn-filled Nanotubes of Single-Crystalline In(OH)₃ Grown by a Solution-Liquid-Solid-Solid Route". Y. Fang, X. Wen, **Shihe Yang**, *Angew. Chem., Int. Ed.* **118**, 4771 (2006).
- 32 "The giant electrorheological effect in nanoparticles colloid". Weijia Wen, Xianxiang Huang, **Shihe Yang**, Kunquan Lu, and Ping Sheng, *Nature Materials*, **2**, 727-730 (2003).
- 33 "Unveiling metal-cage hybrid states in a single endohedral metallofullerene". Kedong Wang, Jin Zhao, Shangfeng Yang, Lan Chen, Qunxiang Li, Bing Wang, Shihe Yang, Jinlong Yang, Jianguo Hou, Qingshi Zhu, *Phys. Rev. Lett.*, **91**, 185504 (1-4) (2003).
- 34 "Formation and decomposition of distonic o-, m-, and p-benzyne radical cations from photolysis of Mg⁺(o-, m-, p-C₆H₄F₂)". Haichuan Liu, Chang-Sheng Wang, Wenye Guo, Yundong Wu, and **Shihe Yang**, *J. Am. Chem. Soc.* **124**, 3794-3798 (2002).
- 35 "UPS of Buckminsterfullerene and other large clusters of carbon". **Shihe Yang**, C. L. Pettiette, J. Conceicao, O. Cheshnovsky, and R. E. Smalley, *Chem. Phys. Lett.* **139**, 233 (1987).