Yu-Yang Zhang / 张余洋

Contact Information

19A Yuquan Road
Beijing, 100049
P. R. China
Web: http://people.ucas.ac.cn/ zhangyuyang

Tel: +86-10-82648047
Cel: +86-15120062397
E-mail: zhangyuyang@ucas.ac.cn

Working Experience

University of Chinese Academy of Sciences Dec. 2016 – Present

Associate Professor
School of Physical Sciences

Vanderbilt University Jun. 2013 – Dec. 2016

Postdoctoral Scholar
In Professor Sokrates T. Pantelides' group,
Department of Physics and Astronomy

Oak Ridge National Laboratory Jun. 2013 – Jan. 2015

Guest Scientist
In Scanning Transmission Electron Microscopy (STEM) group
Materials Science and Technology Division

Rensselaer Polytechnic Institute Jun. 2011 – Jun. 2013

Postdoctoral Research Associate
In Professor Shengbai Zhang's / 张绳百 group
Department of Physics, Applied Physics, and Astronomy

Education

Institute of Physics, Chinese Academy of Sciences Sep. 2005 – Jun. 2011

Ph.D

- Major: Physics
- Advisor: Professor Hong-Jun Gao / 高鸿钧
- Dissertation Topic: "Structures, Dynamic Properties of Metal-Organic Molecule on Au(111) Surface with First Principles Calculations"

University of Science and Technology of China Sep. 2001 – Jun. 2005

Bachelor of Science

- Major: Physics
- Department: Special Class for the Gifted Young

Research Interests

My research interest is to use quantum-mechanical calculations based on density functional theory (DFT) to understand the fundamental physics in emerging quantum materials for future nanoelectronics, quantum information, and energy-related applications. With such understandings, I design novel quantum materials, understand the structure-properties correlations, and propose methods to achieve property modulations for practical applications. My previous and current research projects include first-principle calculations of solid-state materials ranging from crystals, surfaces, interfaces, to various nanostructures.

In particular, I study **(1)** ***Physics and chemistry at surfaces and interfaces:*** the self-assembly of molecules on metallic surfaces, electronic and dynamic properties of surface adsorption, heterogeneous catalysis; **(2)** ***Emergent quantum phenomena:*** low-dimensional topological insulators, ferromagnetic Weyl semimetal, topological superconductors; **(3)** ***Machine learning in condensed matter physics:*** fast processing of scanning probe microscopy images and machine learning for energy-related materials.

Courses

UNDERGRADUATE COURSES:

Atomic Physics, Solid State Physics, Thermal Physics

GRADUATE COURSE:

Density Functional Theory and Its Applications

Selected Publications

[1]. Shiyu Zhu#, Lingyuan Kong#, Lu Cao#, Hui Chen#, Michal Papaj, Shixuan Du, Yuqing Xing, Wenyao Liu, Dongfei Wang, Chengmin Shen, Fazhi Yang, John Schneeloch, Ruidan Zhong, Genda Gu, Liang Fu, **Yu-Yang Zhang***, Hong Ding*, Hong-Jun Gao*. Nearly quantized conductance plateau of vortex zero mode in an iron-based superconductor. *Science*, **367**,(6474) (2020).

[2]. Hui Chen#, Xian-Li Zhang#, **Yu-Yang Zhang#**, Dongfei Wang, De-Liang Bao, Yande Que, Wende Xiao, Shixuan Du*, Min Ouyang, Sokrates T. Pantelides, and Hong-Jun Gao*. Atomically precise, custom-design origami graphene nanostructures. *Science*, **365**(6457), 1036 (2019).

[3]. Wu Zhou#, **Yu-Yang Zhang#**, Jianyi Chen, Dongdong Li, Jiadong Zhou, *et al.* Dislocation-driven growth of two-dimensional lateral quantum-well superlattices. *Sci. Adv.*, **4**, eaap9096 (2018).

[4]. X. Lin#, J. C. Lu#, Y. Shao#, **Y. Y. Zhang#**, X. Wu, *et al.* Intrinsically patterned two-dimensional materials for selective adsorption of molecules and nanoclusters. *Nat. Mater.*, **16**, 717 (2017).

[5]. Peng Gao*, Liping Wang, **Yu-Yang Zhang***, Yuan Huang, Lei Liao, *et al.* High-resolution tracking asymmetric lithium insertion and extraction and local structure ordering in SnS_2. *Nano Lett.*, **16**, 5582 (2016).

[6]. Yunxi Yao, Qiang Fu, **Yu-Yang Zhang**, Xuefei Weng, Huan Li, *et al.* Graphene cover-promoted metal-catalyzed reactions. *Proc. Natl. Acad. Sci.*, **111**, 17023 (2014).

[7]. **Y. Y. Zhang**, Y. Y. Sun, S. X. Du, H. -J. Gao, and S. B. Zhang. Organic salts as super-high rate capability materials for lithium-ion batteries. *Appl. Phys. Lett.*, **100**, 091905 (2012).

[8]. **Y. Y. Zhang**, S. X. Du and H. -J. Gao. Binding configuration, electronic structure and magnetic properties of metal phthalocyanines on Au(111) surface with *ab initio* calculations. *Phys. Rev. B*, **84**, 125446 (2011).

[9]. Q. Liu, **Y. Y. Zhang†**, N. Jiang, H. G. Zhang, L. Gao, *et al.* Identifying multiple configurations of complex molecules in dynamical processes: time resolved tunneling spectroscopy and density functional theory calculation. *Phys. Rev. Lett.*, **104**, 166101 (2010).

[10]. L. Gao, Q. Liu, **Y. Y. Zhang**, N. Jiang, H. G. Zhang, *et al.* Constructing an array of anchored single-molecule rotors on gold surfaces. *Phys. Rev. Lett.*, **101**, 197209 (2008).

# Equal contributions author; * Corresponding author; Click to see my *Google scholar.*

Public Services

Serving as a referee of the following journals: Chin. Phys.; Chem. Mater.; Nano Lett.; Phys. Rev. Lett.; Phys. Rev. B; Appl. Phys. Lett.; Chem. Phys. Lett.

Serving as the Vice Secretary of the Chinese Vacuum Society (2019/11 - 2024/11n)

Honors and Awards

Outstanding Youth Science Foundation of NSFC	August 2019
Beijing New-Star Plan of Science and Technology 2018	October 2017
Pioneer Program of Chinese Academy of Science	February 2017

[updated: May 5, 2020]