

Qiushi Miao

(+86)13262901230 mqs0558@sjtu.edu.cn

EDUCATION

B. S. in Shanghai Jiao Tong University(SJTU)

Aug 2016 - present

Major: Materials Science and Engineering Minor: Computer Science

Major grades: 88.7/100 Ranking: 6/106 (3/27 in 'Hsu Tzuyao' Honor Class)

Core Courses: Thermodynamics of Materials (93)/Materials Physics (94)/ Computational Materials Science (89)/

Materials Physical Property (91)/Calculus II (94)/Probability and Statistics (99)/Physics II (98)/ Physics I (96)

RESEARCH INTERESTS

Electrocatalysts design for Water Splitting Reaction, CO₂ Reduction Reaction, Nitrogen Reduction Reaction

Interface Interaction in Energy Conversion Devices (solar-cell, fuel cell, etc.)

PUBLICATION

Qian Xiang¹, Jiale Wang¹, Qiushi Miao¹ et al. “Recent Process in Self-supported Nanoarray Electrocatalysts for Water-splitting with Diverse Substrates” to be submitted to Materials Today Nano

Qiushi Miao¹, Jianbo Wu. “Nickel hydroxide nanosheets deposited on Nickel nanowire arrays for high performance towards Oxygen Evolution Reaction” to be submitted ACS Catalysis

Shifan Cui¹, Qiushi Miao¹, Zhiwei Yang, Han Zhou. “Solar Cell Photonic Cooler Design with 1D and 2D Combined Photonic Crystals via Passband Broadening.” submitted to Physical Chemistry Chemical Physics

Qian Xiang¹, Fan Li, Jiale Wang, Wenlong Chen, Qiushi Miao et al. “Heterostructured Catalyst with Highly Enhanced Edge Surface for Efficient CO₂ Electrochemical Reduction to CO” submitted to Advanced Functional Materials

SKILLS

Experiment: (1) Electrochemical test: HER, OER, ORR, CO₂RR, NRR test experience;

(2) Chemical synthesis: CVD, Hydrothermal, Electro-oxidation;

Characterization: SEM, TEM, XRD, Raman;

Software: FDTD simulation, Abaqus, Lammmps, Matlab, Ovito, AutoCAD, C/C++ programming;

AWARDS

College Scholarship provided by Shanghai Institute of Silicate, Chinese Academy of Sciences (5/108) Oct 2018

Third-class Prize in Mathematics contest for University Students division in Shanghai Jan 2018

B-class Academy Excellence Scholarship(10/108) Dec 2017, Nov 2018

RESEARCH EXPERIENCE

Self-Supported Electrocatalyst Design for Oxygen Evolution Reaction (OER)

Advisor: Prof. Jianbo Wu, SJTU

Dec 2019 - present

- In-situ grew Ni nanowire@NiOOH nanosheet on Ni foam for low overpotential at large current density in 1M KOH
- Utilized hydrothermal method and electro-oxidation method to acquire NiOOH nanosheet with large ECSA on subtle

Ni nanoarray supported on Ni foam

- Exhibited an overpotential of 330mV@100 mA • cm⁻² with a low Tafel Slope of 54 mv • dec⁻¹
- The lowest overpotential compared with other Ni-based catalysts

Self-Supported Electrocatalyst Design for Hydrogen Evolution Reaction (HER)

Advisor: Prof. Jianbo Wu, SJTU

Nov 2018 - present

- To discover further chemical influence of the substrates on the catalysts for further modification guidance
- Investigated the influence of substrates on activity of MoS₂ in self-supported MoS₂ NS/X foam(X=FeNi, CuNi,CoNi)
- Applied CVD method to grow MoS₂ on bimetal foam from MoO₃ and Sulfur powder in Ar gas flow.
- Exhibited an overpotential of 180mV@10 mA • cm⁻² for CuNi@MoS₂ in 1M KOH

Zn-based Electrocatalyst Design for CO₂ Reduction Reaction (CO₂RR)

Advisor: Prof. Jianbo Wu, SJTU

Dec 2019 – May 2020

- Further modification of the non-precious-metal catalysts for higher selection towards CO product
- Sulfurized ZnO nanoarray into ZnO@ZnS core-shell nanoarrays for electrochemical reduction of CO₂ to CO and H₂.
- Synthesized ZnCu-NC derived from ZIF-8 for CO₂RR, with a high FE efficiency of 96% and investigated the promotion function of MOF structure on CO₂RR

Investigated Cation effect of ionic liquid on HER and Nitrogen Reduction Reaction (NRR)

Advisor: Prof. Yingjie Zhang, University of Illinois Urbana-Champaign(UIUC)

July 2019- Oct 2019

- Investigated the cation effect of ionic liquid in electrolyte on NRR and HER, with a primary conclusion that EMIM and BMIM will inhibit HER reaction
- Set up the NRR test equipment and calibration process in the lab in traditional H-cell

Radiative-cooling materials Design using Finite difference time domain (FDTD) method

Advisor: Prof. Han Zhou, SJTU

Oct 2017- Dec 2018

- Selectively absorption of the sunlight at different wavelength could efficiently decrease the temperature and increase the efficiency
- Used FDTD simulation to design a Photonic Cooler with 1D and 2D combined Photonic Crystals via Passband Broadening,
- Exhibited a 10.1K temperature decrease on mid-IR transparent solar cells, and 2.9K decrease on mid-IR absorptive solar cells

Radiative-cooling materials discovery via phonon spectrum

Advisor: Prof. Han Zhou, SJTU

Oct 2017- Nov 2018

- The discovery of proper materials could offer further diversity for the design of the radiative-cooling materials
- Based on passband analysis, utilized phonon spectrum to choose potential radiative-cooling materials from ceramics
- Synthesized and Investigated the radiative cooling property of BPO₄, which is predicted by the calculated phonon spectrum.