Lei Pan

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Personal Website

QUALIFICATIONS

- Electrochemistry: Demonstrated expertise in a range of electrochemical techniques, including cyclic voltammetry, impedance spectroscopy, chronoamperometry, and scanning probe microscopy.
- Surface Chemistry: Skilled in the characterization and analysis of surface properties utilizing scanning probe microscopy methods (including SICM, SECCM, and AFM) as well as various spectroscopic techniques (FTIR and XPS).
- Synthesis: Extensive experience in both inorganic and organic synthesis and subsequent characterization.
- Modeling and Simulation: Proficient in MATLAB, Python, Mathematica, and COMSOL for modeling interfacial processes.
- Strong leadership, communication, and collaboration abilities.

EDUCATION

University of Michigan, Ann Arbor, USA — Jan. 2019 - Dec. 2019
Master in Chemistry
Major GPA: 4.00/4.00, Overall GPA: 4.00/4.00

Shanghai Jiao Tong University, China — Sept. 2014 - Jun. 2018
Honors Program of Science in Chemistry
Major GPA: 3.56/4.00, Overall GPA: 3.60/4.00

- The Zhiyuan Honors Program is a distinguished initiative designed for the top 5% of students. Zhiyuan College, located within Shanghai Jiao Tong University (SJTU), offers an exceptional educational experience for highly capable individuals. The program focuses on cultivating future leaders in the fields of science and technology.

PROJECT EXPERIENCE

Spectro-electrochemical Study of the Role of the Hydrogen Bond Network in the Hydrogen Evolution Reaction (HER) — Sept. 2020 - Dec. 2023
Research Assistant, Collaborated with Dr. Carlos Baiz and Dr. Hang Ren — University of Texas at Austin

- Employed attenuated total reflection surface-enhanced infrared absorption spectroscopy (ATR-SEIRAS) to elucidate the hydrogen bond network at the electrode-electrolyte interface.
- Performed detailed measurements of hydrogen evolution reaction (HER) kinetics and mass transport in a dimethyl sulfoxide (DMSO)-water cosolvent system utilizing ultra-microelectrodes.
- Demonstrated that the disruption of the interfacial hydrogen bond network by hydrogen bond competitors significantly affects HER kinetics, in addition to its influences on mass transport and reaction sites.

Reductive Desorption of Mixed Self-Assembled Monolayers — Jan. 2019 - Jun. 2020
Research Internship, Supervised by Prof. Charles McCrory — University of Michigan, Ann Arbor

- Optimized the deposition environment for mixed self-assembled monolayers (SAMs) comprising alkanethiol and chlorinated thiol.
- Employed X-ray Photoelectron Spectroscopy (XPS) to quantify the elemental composition of SAMs prior to and following reductive desorption.
- Demonstrated that the two thiol species exhibit differing tendencies to leave the surface, while their electrochemical stabilities are interdependent.

Pyrochlore-Type Iridium Catalysts for Oxygen Evolution Reaction (OER) — Jul. 2017 - Jan. 2018
Research Internship, Supervised by Prof. Hong Yang — University of Illinois at Urbana-Champaign

- Developed an oxygen evolution reaction (OER) catalyst demonstrating low overpotential and enhanced stability under acidic conditions, utilizing lanthanide doping for lattice manipulation.
- Investigated the correlation between OER activity and the atomic numbers of various lanthanides.

Platinum-Based 2D Nanostructures for Methanol Oxidation Reaction (MOR) Nov. 2016 - Jul. 2018
Undergraduate Research Assistant, Supervised by Prof. Jianbo Wu Shanghai Jiao Tong University

- Successfully synthesized 2D nanostructures incorporating platinum group and iron group metals, utilizing tungsten hexacarbonyl ($W(CO)_6$) as a reducing agent in an ethylene glycol solvent.
- Developed a growth mechanism whereby platinum catalyzes the reduction of ethylene glycol, leading to the formation of a net-like polymer that promotes the lateral growth of the metals.
- Achieved enhanced methanol oxidation reaction (MOR) activity compared to conventional platinum catalysts; the addition of iron group metals into the platinum framework significantly increased the surface area and improved the adsorption capacity for active intermediates.

Total Synthesis of Spiro Compounds for Platinum Catalyst Ligands Jul. 2015 - Oct. 2016
Research Intern, Supervised by Prof. Shuyu Zhang Shanghai Jiao Tong University

- Received training in the total synthesis of spiro compounds utilizing the semi-Pinacol rearrangement reaction.

Novel Fluorescent Probe for Hydroxycarboxylate Recognition Apr. 2015 - Mar. 2016
PRP Program, Supervised by Prof. Qinghua Meng Shanghai Jiao Tong University

- Prepared a fluorescent probe for the structural differentiation of gluconate.
- Introduced a novel fluorescence-quenching model to elucidate anomalies in sodium gluconate recognition.

WORK EXPERIENCE

Teaching Assistant
- Physical Chemistry (Lab) Sept. 2020 - Dec. 2023
- Analytical Chemistry (Lecture) Sept. 2021 - Dec. 2022

Undergraduate Teaching Assistant
- International Course: Introduction to Spectroscopy Jun. 2018 - Aug. 2018
- International Course: Introduction to Biophysics Jun. 2018 - Aug. 2018

Administrative Assistant, Zhiyuan College, Shanghai Jiao Tong University Jan. 2018 - Jul. 2018
- Provided administrative support and assisted with various college activities

Trainee Journalist, Global Science magazine(Chinese edition of Scientific American) Aug. 2017 - Present
- Reported on cutting-edge research advancements in science
- Translated authorized articles in the field of chemistry

Tutoring in Mathematics Jan. 2016 - Sept. 2017
Tutoring in Mathematics/English/Physics Dec. 2023 - Present
STEM teacher in Science Aug. 2024 - Present

TECHNICAL SKILLS

- Professional Tools: Electrochemical Measurements, MS Modeling, Gaussian 03W, COMSOL
- Characterization Techniques: TEM, SEM, XRD, XPS, SICM, SECCM
- Technology Languages: HTML, CSS, JavaScript
- Programming Languages: Mathematica, MATLAB, LabVIEW
- Other: Blender, Adobe Suite, Origin, LaTeX, Markdown

HONORS AND AWARDS

Dr. Bennie F. Walker Endowment Fellowship Sept. 2020
Award for Oversea Undergraduate Research (A-level) May 2018
Hanyingjuhua Inspiration Scholarship of Zhiyuan Honors Program May 2015 - 2018
Renwenyu Inspiration Scholarship (top 3%, awarded to 2 students out of 300+) May 2015 - 2018
The National Inspiration Award, China (one of the highest awards for undergraduate) Oct. 2017
Academic Excellence Scholarship of Shanghai Jiao Tong University(top 3%) Oct. 2015 - 2017

Zhiyuan Honors Scholarship of Shanghai Jiao Tong University (top 5%)	Oct. 2016, 2017
Suzhehu Inspiration Scholarship of Shanghai Jiao Tong University (top 3%)	May 2017
Soh Bing Scholarship (one of the oldest Privately Funded Scholarship scheme in China)	Oct. 2014 - 2016

PUBLICATIONS AND PATENTS

Publications:

1. Wenlong Chen, Yanling Ma, Fan Li, Lei Pan, Wenpei Gao, Tao Deng and Jianbo Wu*, Strong electronic interaction of amorphous Fe_2O_3 nanosheets with single atom Pt towards enhanced carbon monoxide oxidation, Advanced Functional Materials, 2019, 29, 1904278.
2. Ziareena A. Al-MualemKeegan, A. Lorenz-Ochoa, Lei Pan, Hang RenCarlos R. Baiz*, Controlling Interfacial Hydrogen Bonding at a Gold Surface: The Effect of Organic Cosolvents, J. Phys. Chem. Lett., 2024, 15, 16, 4391−4399.
3. Ma, Y.; Peng, J.; Tian, J.; Gao, W.; Xu, J.; Li, F.; Tieu, P.; Hu, H.; Wu, Y.; Chen, W.; Pan, L.; Shang, W.; Tao, P.; Song, C.; Zhu, H.; Pan, X.; Deng, T.; Wu, J. Highly Stable and Active Catalyst in Fuel Cells through Surface Atomic Ordering. Science Advances 2024, 10 (42).

Patents:

1. Wenlong Chen, Qian Xiang, Fan Li, Yanling Ma, Fenglei Shi, Lei Pan, et al. Carbon Monoxide Involved Platinum-based Two-Dimensional Material Synthesis Method, China Patent, 2019