Yi Chen

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EDUCATION

UNIVERSITY OF CALIFORNIA, LOS ANGELES   Los Angeles, CA
Doctor of Philosophy, Chemistry   (Expected) Summer 2024
Master of Science, Chemistry   March 2021

FUDAN UNIVERSITY   Shanghai, China
Bachelor of Science, Chemistry   June 2019

SKILLS

Chemistry: Electrochemistry, Electrochemical microfluidic system, Process development and optimization
People skills: Proven communication and presentation skills, Multi-task ability, Problem-solving skills
Characterization: SEM, confocal microscopy
Programming: Python, MATLAB, C++
Other software: COMSOL Multiphysics, Adobe Illustrator, MS Office Suite, Image J, Origin, LAS X
Semiconductor: General photolithography, Etching, ALD, Sputter, e-beam evaporator

RESEARCH & WORK EXPERIENCE

CHONG LIU RESEARCH GROUP   Los Angeles, CA
Ph.D. Student for Inorganic Chemistry Research   Sept 2019 – Present

- Generate oxygen and hydrogen peroxide concentration gradient in an electrochemical microfluidic device
    - Led a team of three working on a multidisciplinary project and arranged weekly meetings
    - Developed micrometer-scale pattern on silicon wafer by photolithography and conducted deep reactive-ion etching (DRIE) to construct microwire arrays of the desired length
    - Developed a method for measuring microwire length using a standard optical microscope, eliminating the need for time-consuming and expensive scanning electron microscope (SEM)
    - Designed and fabricated an electrochemical microfluidic device suitable for optical imaging
    - Utilized electrochemical oxygen reduction reaction to establish oxygen or hydrogen peroxide gradient within a fluidic system
    - Modified electrochemical setup and electrode morphologies to generate oxygen and hydrogen peroxide concentration gradient to mimic gradient in bacterial environment
    - Characterized oxygen and hydrogen peroxide concentration gradient under confocal microscopy
    - Used ImageJ, MATLAB, and Python to analyze confocal microscope images
    - Used COMSOL Multiphysics to simulate oxygen reduction reaction on Au and Pt electrode surfaces under flow condition
    - Presented research findings at two international conferences and within the research group

- Research on surface-modified electrode using mesoporous silica
    - Electrochemically deposit a spatially uniform layer of mesoporous silica onto the surfaces of gold and platinum electrodes
    - Fine-tuned the mesoporous silica surface morphology by changing applied potential, deposition time, and precursor solution composition
    - Performed cyclic voltammetry (CV) to evaluate the ion permselectivity of the silica coating

- Provided guidance to an undergraduate student in collaborator's group on the synthesis and characterization of mesoporous silica materials

- Research on surface-modified electrode using porous copolymer
    - Electropolymerize a uniform layer of porous copolymer to coat the surfaces of Au and Pt electrodes
    - Performed electrochemical measurement on rotating disk electrodes to study the permselectivity of the copolymer coating and identify the threshold size for molecule passage
    - Characterized the molecular structure of the copolymer using attenuated total reflection infrared spectroscopy
    - Incorporated a copolymer-coated electrode in an electrochemical microfluidic system for microbiological application

PROCESS & INSTRUMENT

CHONG LIU RESEARCH GROUP   Los Angeles, CA
Electrodeposition group specialist   Oct 2020 – Present
- Developed and modified a Pt electrodeposition recipe enabling tunable Pt surface morphology
- Developed and modified a mesoporous silica electrodeposition recipe enabling tunable silica surface morphology and thickness
- Developed a copolymer electrodeposition recipe

Electrochemical microfluidic system designer   Jan 2020 – Present
- Designed an electrochemical microfluidic system with tunable flow chamber height
- Modified an electrochemical microfluidic system to achieve both high-resolution bacteria imaging and stable electrochemical performance
- Established protocols of inoculation in microfluidic devices for three bacterial strains
- Incorporated a mixing subunit at the inlet of the flow system

Confocal microscopy group lead   Oct 2020 – Present
- Developed a confocal microscopy optical setting for hydrogen peroxide fluorescence imaging
- Established a confocal microscopy optical setting for oxygen phosphorescence imaging
- Modified confocal microscopy optical setting to reduce photobleaching of bacterial fluorescence protein and increase signal noise ratio
- Created a fluorescence detection protocol for live/dead staining imaging

PUBLICATION

[1] **Chen, Y.**; Wang, J.; Hoar, B. B.; Lu, S.; Liu, C., Machine learning–based inverse design for electrochemically controlled microscopic gradients of O_2 and H_2O_2. *Proc. Natl. Acad. Sci. U.S.A.* **2022,** *119,* e2206321119.

SELECTED PRESENTATIONS & SYMPOSIUM

2022 MRS Fall Meeting Symposium   Nov 2022
Title: Machine learning–based inverse design for electrochemically controlled microscopic gradients of O_2 and H_2O_2

2023 ACS Fall   August 2023
Title: Machine learning–based inverse design for electrochemically controlled microscopic gradients of O_2 and H_2O_2