

Yi Chen

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EDUCATION

UNIVERSITY OF CALIFORNIA, LOS ANGELES

Los Angeles, CA

Doctor of Philosophy, Chemistry

Fall 2019 – Present

- Anticipated Summer 2024
- Advanced to Ph.D. candidate in September 2021
- Master of Science in Chemistry conferred in March 2021
- GPA (Cumulative Total): 3.990

FUDAN UNIVERSITY

Shanghai, China

Bachelor of Science, Chemistry

Fall 2015 – Summer 2019

- Graduated: June 2019

RESEARCH & WORK EXPERIENCE

CHONG LIU RESEARCH GROUP

Los Angeles, CA

Ph.D. Student for Inorganic Chemistry Research

Sept 2019 – Present

- Used microwire array electrodes fabricated on silicon wafer to generate oxygen and hydrogen peroxide concentration gradient in a fluidic device
 - Led a team of three working on a multidisciplinary project and arranged weekly meetings
 - Designed photomask patterns based on different collaborators' requirements
 - Developed micrometer-scale pattern on silicon wafer by photolithography and conducted deep reactive ion etching (DRIE) to construct microwire arrays of the desired length
 - Resolved pattern blurring in photolithography by cleaning photoresist residual on photomask and reducing hard bake temperature
 - Resolved fractured microwire array in the etching process based on DRIE working principle
 - Utilized voltage-induced oxygen reduction 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 and MATLAB to analyze confocal microscope images
 - Performed scanning electron microscope (SEM) imaging of fine features (around 20 nm) of microwire array electrodes
 - Developed a cost-efficient method for rapidly measuring microwire length using a standard optical microscope, eliminating the need for time-consuming and expensive SEM
 - Presented research findings at an international conference and within the research group
- Independent management of atomic layer deposition (ALD) equipment
 - Set up an ALD equipment and especially designed the gas supply pipelines
 - Managed maintenance, calibrations, basic troubleshooting, and unit replace of ALD equipment by executing and documenting all associated activities
 - Deposited titanium dioxide (TiO₂) on silicon wafer and calibrated growing speed by reflectometer
 - Achieved 100% increase in TiO₂ deposition rate by optimizing a suggested recipe
 - Created standard operating procedures and trained new users

- Research on using mesoporous silica coating to modify electrode surfaces (Collaborated with Prof. Yixian Wang group at California State University, Los Angeles)
 - Utilized electrochemistry to deposit a spatially uniform layer of mesoporous silica onto the surfaces of gold and platinum electrodes
 - Fine-tuned the mesoporous silica thickness and surface morphology by changing applied potential, deposition time, and precursor solution composition
 - Conducted SEM imaging to measure the thickness (70-100 nm) and surface morphology of the silica coating
 - Used cyclic voltammetry (CV) to evaluate the charged ion permselectivity of the silica coating
 - Provided guidance to a student in Prof. Wang's group on the synthesis and characterization of mesoporous silica materials
- Used perfluorocarbon nanoemulsion to protect oxygen fluorescence probe from bacterial secretions during oxygen measurement (Collaborated with Prof. Dianne K. Newman group at California Institute of Technology)
 - Experiment design with colleagues to synthesize of oxygen sensing probe in perfluorocarbon nanoemulsion and characterize its fluorescence properties
 - Characterized the nanoemulsion droplet size by dynamic light scattering (DLS)
 - Together with colleagues, developed a plan to use fluorescence lifetime instead of fluorescence intensity for oxygen measurements based on spectroscopic analysis
 - Fluorescence lifetime measurement of probe-contained perfluorocarbon nanoemulsion at different concentrations of pyocyanin, a bacterial secretion
 - Fit the exponential decay of the nanoemulsion fluorescence intensity over time using Python and calculate the fluorescence lifetime

PUBLICATION

[1] **Chen, Y.**; Wang, J.; Hoar, B. B.; Lu, S.; Liu, C., Machine learning-based inverse design for electrochemically controlled microscopic gradients of O₂ and H₂O₂. *Proc. Natl. Acad. Sci. U.S.A.* **2022**, *119*, e2206321119.

SKILLS

1. Good knowledge in ALD usage, management, basic troubleshooting, and process optimization
2. Experience in reactive ion etching
3. Familiarity with general photolithography process
4. Ability to use sputter, e-beam evaporator, and reflectometer
5. Experience in MATLAB/Python/C++ script writing for data analysis
6. Comprehensive experience in SEM imaging and energy dispersive spectrometry (EDS)
7. Solid experience in electrochemistry measurement
8. Experience of 3D modeling with SolidWorks
9. Experience of using COMSOL Multiphysics in simulation of electrochemistry and fluid flow
10. Experience of confocal microscopy imaging

PRESENTATIONS & SYMPOSIUM

Southern California Inorganic Photochemistry Conference	Oct 2022
Title: Machine learning-based inverse design for electrochemically controlled microscopic gradients of O ₂ and H ₂ O ₂	

2022 MRS Fall Meeting Symposium	Nov 2022
Title: Machine learning-based inverse design for electrochemically controlled microscopic gradients of O ₂ and H ₂ O ₂	