

UNDERGRADUATE RESEARCH CO-OP FELLOWSHIP (URCF)

DEPARTMENT OF CHEMICAL AND ENVIRONMENTAL ENGINEERING COLLEGE OF ENGINEERING AND APPLIED SCIENCE

RESEARCH OPPORTUNITIES FOR UNDERGRADUATE students

APPLICATION DEADLINE: April 27, 2025

PROJECT TITLE: <u>Nanocrystalline Ion-Conducting Solid Oxide Materials for High-</u> <u>Temperature Electrolyzers</u>

Physical Requirement : Ability to perform chemical and chemistry lab work Project's Technical Skills Requirement : Basic training in chemistry labs; and good writing skill is a plus Project's Available Positions : 1

Junhang Dong Chemical and Environmental Engineering College of Engineering and Applied Sciences 701L Mantei Center Cincinnati, OH 45221

Project Description

Development of Nanocrystalline Solid Oxide Electrolyte Membranes for High-Temperature Water Electrolyzers

Faculty Advisors: Junhang Dong, Ph.D., Professor of Chemical Engineering Department of Chemical and Environmental Engineering

Oxygen ion conducting solid oxide electrolyzer cells (O-SOECs) can play a vital role in future sustainable energy and green chemicals production through the electrolysis of water or other chemicals using renewable power supply. The O-SOECs offer high efficiency because of reduced reversible cell potential and overpotentials and eliminate the need for precious metal catalysts. However, conventional SOEC materials face serious challenges of interface instability at high temperatures (>750°C) and inadequate conductivity and catalytic activity at low temperatures (