

# The Department of Civil and Environmental Engineering at the University of Houston presents...

## CIVE 6111 Graduate Seminar

### EMERGING ELECTROCHEMICAL PROCESSES FOR CLIMATE CHANGE MITIGATION



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**Friday, August 27, 2021**

2:45pm-3:45pm

Classroom Business Building (CBB) – Room 104

Zoom: <https://uh-edu-cougarnet.zoom.us/j/94327695800>

#### **Abstract**

Earth's climate is now changing faster than at any point in the history of modern civilization, mainly as a result of human activities. Designing any action plan to mitigate climate change must include a detailed strategy to lower greenhouse gas emissions, especially carbon dioxide (CO<sub>2</sub>). Electrochemical technologies have important roles to play in reducing CO<sub>2</sub> emissions. These include more conventional roles, such as the electrification of transportation and the use of grid-scale storage to balance renewables' supply and demand. An additional role that has been researched extensively is the electrosynthesis of chemicals and fuels from CO<sub>2</sub>, providing a utilization strategy. In recent years, various electrochemical processes have been developed to help industries become more energy-efficient and to capture CO<sub>2</sub> from either point sources (e.g., power plant flue gas) or air – these tasks can be considered as the new frontiers within the electrochemistry and climate change framework. In this presentation, I will discuss how electrochemical technologies can provide new solutions to address climate change issues. I will elaborate on the development of a novel thermally regenerative battery to harvest low-grade waste heat as electrical power, aiming to increase the energy efficiency of industrial units. I will also discuss several electrochemically driven cycles investigated for carbon capture applications. These electrochemical processes can be implemented to assist in reducing CO<sub>2</sub> emissions – a major step toward climate change mitigation.

**Keywords:** Climate Change; Electrochemical Processes; Low-grade waste heat; Carbon Capture

#### **Bio**

Dr. Mim Rahimi is an assistant professor of environmental engineering at the Department of Civil & Environmental Engineering at the University of Houston (UH). Before joining UH, Dr. Rahimi was a postdoctoral associate at the Department of Chemical Engineering at Massachusetts Institute of Technology (MIT) under the supervision of Prof. Alan Hatton. He conducted research on developing various electrochemical processes for carbon capture and utilization. Dr. Rahimi obtained his Ph.D. in chemical engineering from The Pennsylvania State University in 2017, supervised by Prof. Bruce Logan. Dr. Rahimi authored and co-authored 18 peer-reviewed articles (11 as the first author) and served as a reviewer for more than 30 scientific journals. He also served as a guest editor for several journals on various topics related to electrochemistry and climate change. In 2020, he established an online educational platform on climate change ([www.ClimateChange.guide](http://www.ClimateChange.guide)) to promote discussions around this topic from different angles, especially highlighting the critical role of diversity, equity, and inclusion in designing, planning, and executing climate change mitigation options.