Postdoctoral Fellow in Distributed Carbon-to-Liquids

Integrated Electrified Distributed Conversion of Carbon into Liquid Chemicals and Fuels

Posted July 22, 2026

SALARY	START DATE	APPOINTMENT	APPLY BY
$63,480 USD/year	**October 1, 2026**	**12 months (renewable)**	**September 1, 2026**

Ted Sargent and group at Northwestern University invite applications for an accomplished, energetic Postdoctoral Fellow to develop next-generation technologies for producing liquid chemicals and fuels from air, methane, LPG, water, and renewable electricity, using integrated electrochemical and non-thermal plasma technologies.

The project aims to create integrated pathways that connect carbon capture, CO_2/CO conversion, selective carbon-carbon coupling, non-thermal plasma-driven partial oxidation, and the provision of products at high concentration. Rather than optimizing an electrocatalyst in isolation, this program treats the catalyst, plasma physics, reaction microenvironment, mass transport, membranes, and reactor architecture as a coupled system whose collective behavior determines atom efficiency, product selectivity, separation intensity, energy consumption, reliability, and durability. The Fellow will investigate the catalytic and transport principles governing the conversion of air-captured CO_2, CO_2-derived intermediates, and methane or light hydrocarbons into specific, substantially pure, valuable products, such as methanol, ethanol, or propanol. Particular emphasis will be placed on controlling proton and cation fluxes, water activity, radical local pH, gas and molecular transport, product losses, and catalyst degradation under commercially relevant operating conditions. The broader goal is to establish materials and device design rules that enable high carbon utilization, selective bond formation, concentrated liquid products, and low-energy operation—thereby advancing an electrified route for storing renewable energy in transportable chemicals and fuels.

RESPONSIBILITIES

- Design, synthesize, and characterize catalysts, electrodes, ion-transport layers, membranes, electrochemical reactors, and non-thermal plasma reactors (e.g., surface-microdischarge architectures) and their electrode, mesh, and dielectric components, for the conversion of air-, water-, and methane-derived carbon into liquid fuels.
- Develop membrane-electrode assemblies, flow cells, and related reactor platforms for CO_2 and CO electrolysis at industrially relevant current densities.
- Develop plasma flow reactors for methane and light-hydrocarbon partial oxidation.
- Investigate how catalyst structure, interfacial chemistry, ion flux, water management, and reactor architecture govern selectivity toward methanol, ethanol, propanol, and other oxygenated products.
- Develop strategies to improve carbon utilization and product concentration by suppressing carbonate formation, hydrogen evolution, product crossover, and parasitic transport.
- Integrate electrochemical and plasma-driven conversion routes with carbon capture, feed purification, and downstream product recovery in collaboration with researchers in separations and systems engineering.

- Apply *in situ* and *operando* characterization, transport analysis, and mechanistic modeling to identify reaction intermediates, local environments, and degradation pathways.
- Lead projects from hypothesis development through first-author publications in high-impact interdisciplinary journals, while contributing to project reviews, mentoring, and external funding proposals.

QUALIFICATIONS

- Ph.D. in chemistry, chemical engineering, materials science, physics, or a related field, completed or expected before the start date.
- Strong hands-on experience in electrochemistry, electrocatalysis, electrochemical engineering, non-thermal plasma chemistry or engineering (e.g., surface-microdischarge or related reactors), or related reaction and transport processes.
- Expertise in catalyst or electrode synthesis, electrochemical cell fabrication, and quantitative product analysis using techniques such as gas chromatography, liquid chromatography, NMR spectroscopy, or mass spectrometry.
- Familiarity with ion-exchange membranes, bipolar membranes, porous diaphragms, carbon capture, separations, or multiphase transport would be advantageous.
- Experience with *in situ* or *operando* characterization, numerical transport modeling, high-throughput experimentation, automation, or data-driven materials discovery is desirable.
- An exceptional record of first-author publications demonstrating independent experimental design, mechanistic insight, and the ability to carry a research project from hypothesis to publication.
- Excellent written and verbal communication skills and the ability to thrive in a large, multi-institutional, interdisciplinary team.

HOW TO APPLY

Please include the following in your application package:

- A one-page research proposal responsive to the directions and criteria outlined in this job ad
- Your academic CV, including a section dedicated to your first-authored papers. This should include a list of three referees who are prepared to be consulted

Please use the **application link here.**