



SUPERVISOR INFORMATION	
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Department	Chemical Engineering Department
Field of research	PEM electrolysis
PROJECT PROPOSAL	
Title	Reducing the Cost of Green Hydrogen: Cost-Effective Solutions for the Bipolar Plates of PEM Electrolyzers
Brief project description	
<p>The global transition to renewable energy is essential for addressing climate change, with green hydrogen emerging as a key solution. Proton Exchange Membrane Electrolyzers (PEMELs) are promising technologies for hydrogen production, but the high cost of Bipolar Plates (BPPs) limits their widespread use. BPPs are crucial for the flow of water and gases, and they provide electrical contact between cells within a PEMEL. Currently, titanium (Ti) is used for BPPs due to its corrosion resistance, but its high cost and challenging machining process make up a large portion of PEMELs cost.</p> <p>This research aims to reduce BPP production costs through two approaches: (1) replacing machined flow fields (FFs) with Ti meshes and (2) utilizing Cold Gas Spray (CGS) technology for additive manufacturing (AM) and protective coatings.</p> <p>Ti meshes are widely available and more affordable than machined Ti, but their properties - such as thickness, porosity, and pore size - must be optimized for electrical conductivity, mass transport, and mechanical strength. This research will test various Ti mesh configurations to evaluate their performance in PEMELs.</p> <p>CGS will be used to fabricate FFs by AM and apply protective coatings. CGS accelerates metal powders onto substrates without melting, offering faster deposition rates without the need for inert/controlled chambers. Protective coatings of noble metals or more affordable alternatives, like niobium or titanium nitride, will be applied to enhance corrosion resistance. The use of lower-cost substrates such as stainless steel will also be evaluated.</p> <p>The results of this research aim to reduce BPP costs, improving the affordability of PEMELs and advancing green hydrogen technologies for a cleaner energy future.</p>	