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***Analysis and mitigation of oxygen electrode delamination in solid electrolyzer cells***

Hydrogen production using solid oxide electrolyzer cells (SOECs) suffers from rapid degradation issues. In order to understand these problems unique to electrolysis, more information on the conditions of SOEC failure is needed. A current model by Anil Virkar addressing degradation in SOECs based on non-equilibrium thermodynamics is summarized. The model indicates high pressures developing in the electrolyte under certain conditions may be the source of the oxygen electrode delamination reported in the literature. It is predicted that introducing some electronic conductivity into the electrolyte will mitigate this delamination. The process of fabricating solid oxide electrolyzer cells to verify the model begins with tape casting a Ni-based supporting anode for consistent performance across all cells. The electrolyte is deposited by spin-coating layers to vary the thickness. The progress on fabrication and the use of ceria in the electrolyte or a ceria-based interlayer as options to increase the electronic conductivity is addressed. Future work on alternative cathode materials is suggested.