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Abstract

Utilizing hydrogen gas as an energy carrier and enabling a hydrogen economy is a promising step towards decarbonization. Water electrolysis is a key process in hydrogen generation, but electrolyzers face a couple technological hurdles before widespread integration could occur. Understanding morphology evolution and transport processes in an operating polymer electrolyte membrane (PEM) electrolyzer is key to reducing cost and increasing efficiency. In this study, combined *operando* X-ray computed tomography and radiography are used to study transport and degradation in PEM electrolyzers subject to applied current densities. Tomography enables three-dimensional steady-state imaging but does not capture transport subtleties. Radiography is limited to two-dimensions but does capture transient