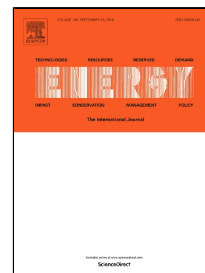


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Influence of operation parameters on mode switching from electrolysis cell mode to fuel cell mode in a unitized regenerative fuel cell

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Abstract: The process during mode switching from electrolysis cell mode to fuel cell mode is unclear. In this work, dynamic responses under different mode switching strategies from electrolysis cell mode to fuel cell mode are investigated using a unitized regenerative fuel cell with an oxygen side transparent window. Effects of time interval between reactant and current switching, gas flow rate, fuel cell mode startup current density, and gas purging time on the cell voltage are studied. The experimental results indicate that pre-reactant switching is an effective way to consume the residual water at the end of an electrolysis cell mode, and a sufficient time interval between reactant and current transition can promote the smooth mode switching under low current density. Oxygen flow rate increase can promote smooth startup of FC mode when the time interval between reactants and current transitions is not long enough, and hydrogen flow rate has little effect on the mode switching from EC mode to FC mode. In addition, the method, combining electrolysis reaction and gas purge, can efficiently eliminate the residual water and prevent water-starved condition when FC mode starts up.

Key words: Unitized regenerative fuel cell; Mode switching; Pre-reactant switching; Switching

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