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# The stability challenge on the pathway to high-current-density polymer electrolyte membrane water electrolyzers

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**Abstract**

The investment costs for polymer electrolyte membrane (PEM) water electrolysis can be reduced if systems are operated at elevated current densities. However, it remains unknown how this affects long-term stability. In this study, we elucidate the durability and degradation phenomena that occur in our test cells at high (2 A $cm^{-2}$) and elevated (up to 3 A $cm^{-2}$) current densities during constant and intermittent operation. Up to 2 A $cm^{-2}$, stable cell performance was achieved under both régimes. At elevated current densities, two primary factors caused performance degradation, namely the increase in ohmic cell resistance and the appearance of mass-transport resistance, both of which contribute to the voltage increase in equal measures. By varying the way in which the cell is assembled, it was found that both effects relate to the anti-corrosion coating of the titanium porous transport layer (PTL), which was stable at 2 A $cm^{-2}$ but detached