

Effect of membrane thickness on the degradation of PEM water electrolyzer

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MEAs (membrane electrode assembly) performance of PEM water electrolyzer with different membrane thicknesses (N117, N115, and NR212) were compared for 144 h at 3.0 A/cm². MEA with NR212 showed the best performance which could operate at 3.5 A/cm² while still maintaining efficiency above 70% LHV. Different contributions to overall degradation with different membrane thicknesses. Main reason of the degradation for N117 and N115 was the ohmic resistance increase with a higher degradation rate for the thicker membrane. More significant degradation of the thicker membrane was because of higher anode potential above 2.0 V that can lead to a higher iridium dissolution rate and faster passivation of titanium porous transport layer. In contrast, the degradation of NR212 was mainly contributed by the kinetic overpotential increase. This remarkable kinetic degradation could be witnessed in the surface change of anode catalyst which was confirmed by anode cyclic voltammograms of MEA. It is also noticeable that although the ohmic degradation of N115 and NR212 were nearly identical, their origins were different.