F-doped tin oxide coated SUS 316 for fuel cell bipolar plates by ECR-MOCVD at low temperature.

SUS 316 was effectively coated with 600nm thick F-doped tin oxide (SnOx:F) by electron cyclotron resonance-metal organic chemical vapor deposition and investigated in simulated fuel cell bipolar plates. The results showed that an F-doped tin oxide (SnOx:F) coating enhanced the corrosion resistance of the alloys in fuel cell bipolar plates, though the substrate steel has a significant influence on the behavior of the coating. Effect of H2/Ar plasma treatment on SUS 316 for fuel cell bipolar plates steel was obtained surface of the clean substrate steel. Coating SUS 316 for fuel cell bipolar plates steel further improved the already excellent corrosion resistance of this alloy. For coated steels, both potentiostat polarizations and H2/Ar plasma treatment results showed that the corrosion rate of the SUS 316 for fuel cell bipolar plate steels increased with decreasing concentration of EtOH. By comparison, as the concentration of EtOH increases, the corrosion reaction is decreased by a preservative property based on both the increase of the corrosion resistance and the formation of the constant reactive film. The SnOx:F coating seems add an additional resistance to the native air-formed film on these stainless steels.

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