Abstract

In order to protect the cathode from chromium poisoning and the interconnect from oxidization, a mixture of Co and Sm$_{0.2}$Ce$_{0.8}$O$_{1.9}$ (SDC) layer is deposited on the surface of AISI 441 ferritic stainless steel by an electrodeposition and electrophoresis composite method. The content of SDC can be effectively controlled by adjusting the pH of the suspension. After oxidization at 800°C for 2 hrs, Co is completely oxidized into spinel Co$_3$O$_4$, which is conductive at high temperature. SDC is stable and can be used as the catalyst for cathode material to improve its electrochemical performance. The conductivity of the coated AISI 441 is measured at 800°C for 120 hrs with a 200 mA/cm$^2$ current density and it increases with duration, while that of the uncoated AISI 441 decreases due to its oxidization. In addition, the solid diffusion of chromium is effectively prohibited by the protective layer.

Biosketch

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