Oxidation Behaviors Studies of $Mn_{1.5}Co_{1.5}O_4$-Coated and Uncoated Low-Chromium Alloys as Solid Oxide Fuel Cell Interconnects (SOFC)

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Ferritic stainless steel alloys have a combination of good oxidation resistance and appropriate coefficient of thermal expansion that makes them attractive for use as interconnect in SOFC. However, Cr in ferritic alloys can lead to poisoning of the cathode, so ceramic coatings are applied to reduce chromium volatilization. With the use of coatings, alloys with lower chromium contents could potentially be used. In this work, the oxidation behaviors of a series of ferritic steel alloys, $Mn_{1.5}Co_{1.5}O_4$-coated and uncoated, with Cr contents from 13-18% and other alloying additions typical of those of AISI 441 (*i.e.* small amounts of niobium and titanium) were evaluated. The dual oxidation behaviors of uncoated ferritic alloys with different Cr concentration were compared. Samples with higher Cr concentration showed better dual oxidation resistance. After dual oxidation, samples with lower Cr concentration showed some large Fe_2O_3 nodules. Cyclic and isothermal oxidation behavior of $Mn_{1.5}Co_{1.5}O_4$-coated with different Cr concentration were also studied and higher Cr concentration leads to better adherence of coating to the substrate alloys.