Electrodeposited Mn-Co Alloy Coating For SOFC Interconnects

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Reducing SOFC operating temperatures below 1000 ºC has permitted less resistive and expensive ferritic stainless steel interconnects to replace ceramic materials. However, even specially developed ferritic alloys operated at elevated temperatures for lengthy periods of time form a chromia scale that increases the interconnect resistance and results in chrome diffusion from the interconnect to the cathode that causes a reduction in cathode performance. One attractive method to resolve the chromia scale growth and diffusion issues is to electrodeposit a Mn-Co alloy coating onto the interconnect surface and subsequently convert it to a $(Mn,Co)_3O_4$ spinel.

Under funding from the Department of Energy, Faraday Technology and WVU demonstrated that the electrodeposition process can produce Mn-Co alloy coatings with adequate adhesion after 2000 hrs at 850ºC for specific compositional ranges and that a 3 μm coating is sufficient to minimize chrome diffusion to the surface after 500 hrs at 800°C in air. Furthermore, a preliminary economic assessment, based on a batch manufacturing process, suggests that the pulse/pulse reverse electrodeposition technology can meet the Department of Energy's high volume target of 1,600,000 plates per annum at a cost of ~$1.23 per 25 cm x 25 cm coated interconnect. The poster will present the results obtained to date and provide a path forward for the technology.