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SOFC half-cells, consisting of porous NiO-SDC (nickel oxide-samarium doped ceria) anode sublayers and thin SDC electrolytes were fabricated. The layers were consecutively deposited onto porous metallic interconnects by suspension thermal spraying, using standard industrial thermal spray equipment. The liquid carrier employed in this approach allows for controlled feeding of much finer particles than in conventional thermal spraying, leading to thin coatings with refined microstructure. The superior ionic conductivity of ceria-based ceramics over conventional zirconia-based SOFC materials has generated considerable interest in developing cost-effective techniques for producing those layers. As compared to zirconia, however, ceria is generally more difficult to process due to its higher melting point, lower strength and possible decomposition and evaporation during thermal spraying.

Suspension spraying was implemented for an axial injection plasma torch and a high-velocity oxy-fuel (HVOF DJ-2700) hybrid gun. The novel approach of using HVOF suspension spraying was found promising in limiting material decomposition, enhancing deposition efficiency and reducing defect density in the resulting coating. The effect of process parameters on the in-flight particle temperature and velocity are discussed and plasma and flame sprayed coating characteristics are compared. Selected electrochemical properties of the coatings are presented.