ELABORATION OF A POROUS AND CONDUCTIVE (La,Sr)CrO_3 ANODE FOR SOFC WORKING UNDER METHANE

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Strontium doped lanthanum chromite (LSC) has been recently considered as a promising anode material due to its satisfactory electronic conductivity, its thermal expansion coefficient close to that of YSZ electrolyte and its stability under reducing environment[1-2]. Moreover, under direct methane feed, LSC seems to have a low activity with respect to carbon deposition[3]. Nevertheless, little work has been done to elaborate a porous, conductive and stable (mechanically and chemically) anode using LSC materials, and we already know, from literature on LSC interconnectors, that problems of pure phase synthesis and/or sintering can occur and impede potential applications.

In a previous work, we presented some first electrochemical characterizations of LSC/YSZ/LSM electrolyte supported cells tested under a steam-methane mixture. The poor electrochemical characteristics were attributed to a poor interfacial toughness[4]. More recently, our in depth analysis of the electrochemical response allowed to identify two other major problems: (i) an intrinsically lower conductivity of the LSC compound under reductive atmosphere (ii) a poor control of the sintering of the anodic layer, preventing the good electronic percolation.

Thus we embarked on an analysis of the synthesis and calcination conditions necessary to elaborate a reactive $La_{0.7}Sr_{0.3}CrO_3$ powder with the aim of obtaining a pure, porous and conductive anode by natural sintering. After optimisation, we could achieve sufficiently good physicochemical characteristics to hope using this compound on the anodic side of an SOFC.

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