Synthesis and electrochemical characterization of T* $La_{0.84}Sm_{0.96}Sr_{0.2}CuO_4$ as a cathode material for IT-SOFC

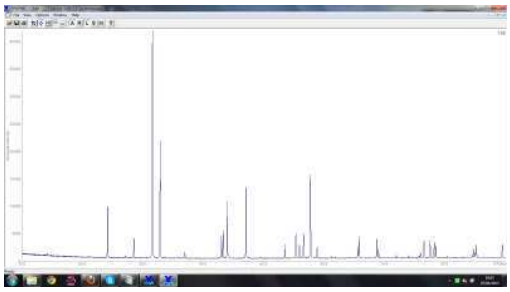
Akshaya K Satapathy, & J.T.S. Irvine*

School of Chemistry, University of St Andrews, North Haugh, St Andrews, Fife, KY16 9ST, Scotland, United Kingdom. Tel: +44 1334 463817

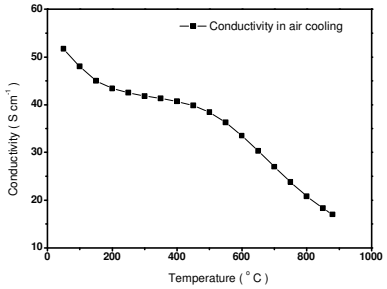
**** Email: jtsi@st-andrews.ac.uk***

Abstract

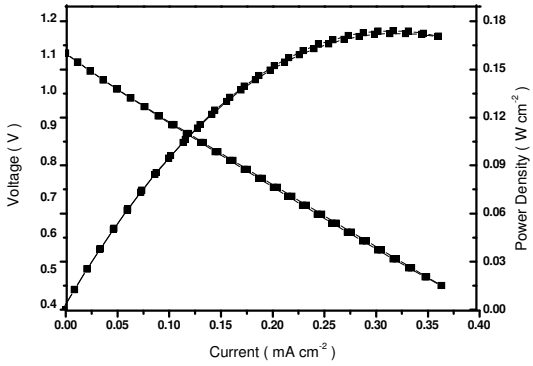
The synthesis and electrochemical characterisation of T* based $La_{0.84}Sm_{0.96}Sr_{0.2}CuO_4$ (LSSCu) has been carried out in order to use as a cathode material for intermediate temperature solid oxide fuel cell application. XRD studies shows, the phase pure material and matches with the JCPDF (# 79-1861), belong to space group of P4/nmmz. The electrical conductivity value decreases from 52 Scm^{-1} at room temperature to 18 Scm^{-1} at 850 ^oC showing metallic behaviour in all temperature range. A decrease in conductivity, decreasing the partial pressure of oxygen implying the above material is p-type conductor. The Coefficient of thermal expansion value measured from Dilatometry is 12.4 * 10 $^{-6}$ K^{-1} which matches with $La_{0.9}Sr_{0.1}Ga_{0.8}Mg_{0.2}$ (LSGM). Symmetrical cell testing results shows that the area specific resistance is 0.02 $ohm.cm^2$ at 800 ^oC when the 50:50 weight ratio of the LSSCu and LSGM composite was screen printed on LSGM electrolyte and sintered at 900 ^oC for 1 hr. The maximum power density of 390 $mW.cm^{-2}$ has been achieved on 350 µ LSGM electrolyte support cell.



XRD of $La_{0.84}Gd_{0.96}Sr_{0.2}CuO_4$



Electrical Conductivity w.r.t. temperature studies in air



Power density curve for LSSCu + LSGM (50: 50) using LSGM electrolyte supported cell