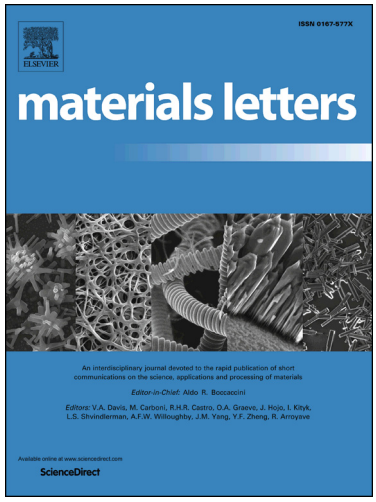

Novel Layered Perovskite $SmBaMn_2O_{5+\delta}$ for SOFCs Anode Material

Abdalla M. Abdalla, Shahzad Hossain, Pg Mohd Iskandar Petra, Cristian D. Savaniu, John T.S. Irvine, Abul K. Azad

PII: S0167-577X(17)30911-4
DOI: http://dx.doi.org/10.1016/j.matlet.2017.06.029
Reference: MLBLUE 22741

To appear in: *Materials Letters*

Received Date: 11 March 2017
Revised Date: 20 May 2017
Accepted Date: 6 June 2017

Please cite this article as: A.M. Abdalla, S. Hossain, P.M.I. Petra, C.D. Savaniu, J.T.S. Irvine, A.K. Azad, Novel Layered Perovskite $SmBaMn_2O_{5+\delta}$ for SOFCs Anode Material, *Materials Letters* (2017), doi: http://dx.doi.org/10.1016/j.matlet.2017.06.029

Novel Layered Perovskite $SmBaMn_2O_{5+\delta}$ for SOFCs Anode Material

Abdalla M. Abdalla[1,2*], Shahzad Hossain[1,3], Pg Mohd. Iskandar Petra[1], Cristian D. Savaniu[4], John T. S. Irvine[4], Abul K. Azad[1,*]

[1]*Faculty of Integrated Technologies, Universiti Brunei Darussalam, Jalan Tungku Link, Gadong BE 1410, Brunei Darussalam*

[2]*Mechanical Engineering Department, Faculty of Engineering, Suez Canal University, Ismailia 41522, Egypt*

[3]*Institute of Nuclear Science and Technology, Bangladesh Atomic Energy Commission, GPO Box No 3787, Dhaka 1000, Bangladesh*

[4]*Center for Advanced Material, School of Chemistry, University of St Andrews, Fife KY169ST, Scotland, UK*

*Corresponding author: abdalla.m.a1984@gmail.com /14h8851@ubd.edu.bn and abul.azad@ubd.edu.bn

Abstract

$SmBaMn_2O_{5+\delta}$ (SBMO), a novel layered perovskite compound with samarium based material (Sm^{+3}) as rare earth doped in A-site was synthesized and processed by using dry chemistry method (solid state solution). Structural characterization of SBMO has been investigated by X-ray diffraction (XRD) and scanning electron microscopy (SEM). While, thermal and electrochemical testing were done by using thermogravimetric analysis (TGA) and current voltage measurements. The Rietveld analysis of XRD data shows that SBMO was crystallized in the orthorhombic structure with the Pmmm space group. The surface morphology images showed a porous structure which indicates that this material can be used as a potential electrode in solid oxide fuel cells (SOFCs). TGA result showed the mass loss of 0.022% for $SmBaMn_2O_{5+\delta}$ which is very small and indicates that the material is very stable. DC conductivity and performance test were done at RT in air atmosphere. The performance tests have done at 800 °C and 750 °C and the maximum power density was found to be 0.4 W/cm^2 at 800 °C.

Keywords: Layered pervoskite; structural analysis; power density measurements, SOFCs anode.

1. Introduction

Nowadays, SOFCs are considered the most promising energy conversion devices and its efficiency is to get the highest performance through electrochemical reactions [1-2]. SOFCs have versatile applications in energy sector like; transportation, remote power sources, military use, remote villages, aerospace and smart portable electronic devices. The anode of SOFC is the most important due to its