



UNIVERSITÀ  
DEGLI STUDI  
DI PADOVA



Evento patrocinato dal  
Consiglio di Padova



Società Chimica Italiana  
Divisione di Elettrochimica

## Giornate dell'Elettrochimica Italiana GEI 2019



***Program and Book of Abstracts***

8-12 September 2019 Padova, Italy

## Synthesis and electrochemical performance of multicomponent oxide materials toward oxygen reduction reaction

Miroslava Varničić<sup>a,\*</sup>, Sanja Eraković<sup>a</sup>, Miroslav Pavlović<sup>a</sup>, Srećko Stopić<sup>b</sup>, Jasmina Stevanović<sup>a,c</sup>, Vladimir Panić<sup>a,c,d</sup> and Bernd Friedrich<sup>b</sup>

<sup>a</sup> Institute of Chemistry, Technology and Metallurgy, Department of Electrochemistry, University of Belgrade, Njegoseva 12, 11 000 Belgrade, Serbia

<sup>b</sup> Process Metallurgy and Metal Recycling, RWTH Aachen University, Intzestraße 3, 52056 Aachen, Germany

<sup>c</sup> Centre of Excellence in Environmental Chemistry and Engineering-ICTM, University of Belgrade, Njegoseva 12, 11 000 Belgrade, Serbia

<sup>d</sup> State University of Novi Pazar, Department of Chemical-Technological Sciences, Vuka Karadžića bb, 36 300 Novi Pazar, Serbia

\*E-mail: [mima.varnicic@gmail.com](mailto:mima.varnicic@gmail.com)

Low cost and highly active electrocatalysts for the oxygen reduction reaction (ORR) are necessary for the development of fuel cells and metal air batteries. Currently, Pt based electrodes have the best catalytic performance but due to its high cost its employment on a significant scale is limited [1]. Perovskite materials would be a good alternative because of its abundant supply, environmental benignity, electronic structure, ionic conductivity and redox behavior [2]. Therefore, the aim of this work is synthesis and characterization of Lanthanum cobalt oxide (LaCoO<sub>3</sub>) powders doped with Manganese (Mn) - LMCO or Strontium (Sr)- LSCO, as promising candidates for energy storage and conversion devices. Ultrasonic spray pyrolysis (USP) was used to successfully synthesize spherical sub- $\mu\text{m}$ -sized of La<sub>0.8</sub>Sr<sub>0.4</sub>CoO<sub>3</sub> and La<sub>0.8</sub>Mn<sub>0.4</sub>CoO<sub>3</sub> perovskite type materials. Detailed microscopic analysis (SEM-EDX, TEM, XRD) as well as electrochemical characterization by CV, LSV and EIS technique has been conducted.

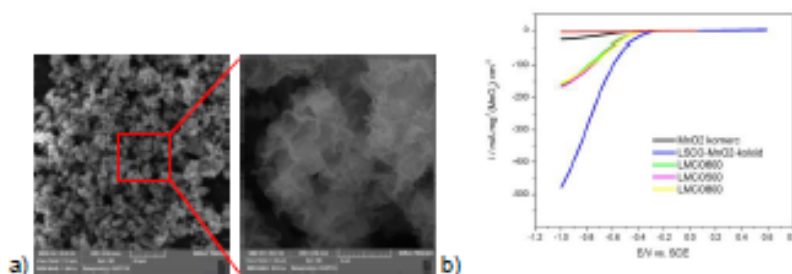


Figure 1: a) SEM images of LMCO prepared materials at 600° b) LSV performance and comparison of LMCO, LSCO and MnO<sub>2</sub> electrodes for oxygen reduction

The investigation of different perovskite-based electrodes showed excellent catalytic activity toward oxygen reduction in alkaline medium. Our work indicates that synthesized perovskite materials especially doped with Mn show potential application in the field of catalysis and are worthy of further investigation.

[1] I Roche et al. *J. Phys. Chem. C.*, 2007, 111, 1434–1443.

[2] H. Zhu, P. Zhang, S. Dai, *ACS Catal.*, 2015, 5, 6370–6385.