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**8<sup>th</sup> Kurt Schwabe Symposium**

# **Book of Abstracts**

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## Electrochemical performances of rare earth Co-based mixed oxides and their application as supercapacitors and fuel cells

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Perovskite have emerged as promising materials in newly invented energy storage and conversion devices due to their exceptional thermal stability, electronic structure, ionic conductivity, electron mobility, and redox behaviour [1]. Among perovskite that are suitable as catalyst for electrode in supercapacitors and solid oxide fuel cells, lanthanum strontium cobalt oxides have shown promising catalytic activity and relatively high stability [1]. Also, Co-based lanthanum manganite (LMCO) has been used as cathode material with a high electro-chemical catalytic activity for oxygen reduction[2]. Ultrasonic spray pyrolysis (USP) was used to successfully synthesize spherical sub- $\mu\text{m}$ -sized of  $\text{La}_{0.6}\text{Sr}_{0.4}\text{CoO}_3$  (LSCO) and Mn and Sr-doped  $\text{LaCoO}_3$  powders. LSCO should be of wider voltage window than carbonaceous materials, with the possibility to adopt the pseudocapacitive oxide, such as  $\text{RuO}_2$ , not only by simple surface adsorption, but over full or partial incorporation into the oxide structure. Hence, this work aims to investigate supercapacitive potentials of pure LSCO prepared by single step USP and LSCO doped with  $\text{RuO}_2$ . The catalytic activity of Sr and Mn cation substitution in lanthanum cobalt oxide was also investigated.

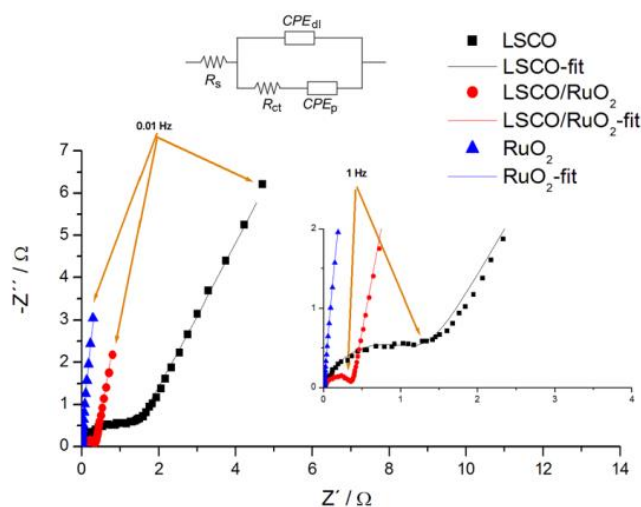


Figure 1. Nyquist plots of LSCO, LSCO/ $\text{RuO}_2$  and  $\text{RuO}_2$  in 0.10 M KOH at open circuit potential.

Electrochemical behaviour was investigated by EIS, CV and LSV techniques. The EIS and CV analyses showed that  $\text{RuO}_2$  catalyzes the redox transition of Co species, with simultaneous proportional increase in pseudocapacitive abilities of  $\text{RuO}_2$  itself while being hosted by LSCO. The investigated LMCO electrodes by CV and LSV techniques showed excellent catalytic activity for oxygen reduction. Our work indicated that these perovskite shows potential applications in the field of pseudocapacitance electrode materials and is worthy of further investigation.

### References

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