

Oxygen evolution reaction: activity vs. oxygen vacancies in $\text{PrBaCo}_{2-x}\text{O}_{5+\delta}$

Wednesday, 30 October 2019 15:20 (20 minutes)

Cobalt-based layered perovskites have emerged as promising electrocatalysts for the oxygen evolution reaction, but important fundamental questions regarding the reaction mechanisms and the design principles for highly active perovskite electrocatalysts are still open. An important development in this sense has recently emerged in a study by Fabbri et al.[1], who demonstrated that oxygen vacancies can play a critical role in the oxygen evolution reaction mechanism and thus, on the perovskite electrochemical activity.

Double perovskite oxides, such as $\text{PrBaCo}_{2-x}\text{O}_{5+\delta}$ (PBCO) [2,3], are known to be able to incorporate a large amount of oxygen vacancies, and also to show high oxygen mobility [4-5]. These properties make them ideal candidates for oxygen evolution reaction electrocatalysis. In this work we combine high-resolution neutron and X-ray diffraction, XAS, magnetic and electrochemical analysis to understand the correlation between catalyst activity and oxygen vacancy amount and distribution.

References

- [1] E. Fabbri et al., Nat. Mater. 16, 925 (2017)
- [2] S. Streule et al., Phys. Rev. B 73, 94203 (2006)
- [3] S. Streule et al., J. Phys-Condens. Mater. 17, 3317 (2005)
- [4] G. Kim et al., J. Mater. Chem. 17, 2500 (2007)
- [5] J. Liu et al., Appl. Phys. Letters 100, 193903 (2012)

Position

Postdoc

Primary authors: MARELLI, Elena (PSI); Dr MEDARDE, Marisa (Paul Scherrer Institut); AEGERTER, Dino (PSI); Dr DAWRYLUK, Dariusz (Paul Scherrer Institut); Dr POMJAKUSHINA, Ekaterina (Laboratory for Multiscale Materials Experiments, Paul Scherrer Institut, 5232 Villigen PSI, Switzerland); FABBRI, Emiliana (Paul Scherrer Institut); SCHMIDT, Thomas Justus (Paul Scherrer Institut)

Presenter: MARELLI, Elena (PSI)

Session Classification: Contributed talks

Track Classification: Oral presentation