

## **La<sub>1-x</sub>Sr<sub>x</sub>MnO<sub>3±δ</sub> AS A NONSTOICHIOMETRIC MODEL SYSTEM FOR THE CATALYSIS OF OXYGEN EVOLUTION REACTION**

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The main issue of electrochemical water splitting is the search for suitable catalyst materials for the kinetically hindered oxygen evolution reaction (OER) at the anode. The state-of-art precious metal catalysts suffer from their high price and insufficient long term stability in the common electrolytes. Binary or multinary transition metal oxides in alkaline medium are an cost-efficient alternative, since they can achieve both lower overvoltages as well as better long-term stability than precious metal oxides. One of the best-studied materials for SOFC applications is the perovskite system La<sub>1-x</sub>Sr<sub>x</sub>MnO<sub>3±δ</sub> (LSMO). Due to its general nonstoichiometry and the large variety of possible defect species it is a perfect model system for studying the influence of defect chemistry on the catalytic activity in OER. We have systematically investigated LSMO as a nonstoichiometric model catalyst system for OER in alkaline media. Nanocrystalline powders over the whole composition range have been prepared by a sol-gel based auto combustion method. XPS and XRD analysis verified the presence of pure phase materials with a continuous change of manganese oxidation state from Mn<sup>3+</sup> to Mn<sup>4+</sup>. Measurements in an electrochemical RDE setup showed a clear trend in catalytic activity in OER with the highest values at medium La/Sr compositions. An equivalent trend could also be observed in the electrical conductivity of the powders, leading to the assumption of a higher polaron hopping probability at medium La/Sr compositions. Additional annealing of pristine powder samples in oxidizing and reducing atmospheres caused a further change in manganese oxidation state and ongoing electrochemical measurements should reveal whether the defined adjustment of the nonstoichiometry will lead to an improvement of catalytic activity compared to the untreated catalysts.