Perovskites As Electrocatalysts for Alkaline Water Electrolysis

Water electrolysis is a promising technology for the production of hydrogen as a sustainable energy storage source, combined with solar or wind power. In this work various electrocatalysts for the Oxygen Evolution Reaction (OER) electrode were synthesized and characterized by several techniques such as X-ray diffraction, electrical conductivity, scanning electron microscopy (SEM), energy dispersive microscopy (EDX) and rotating disk electrode. The perovskites tested in this work were both produced by a ball-milling technique and by an auto-combustion synthesis, which appeared to be a fast and robust method for synthesis of perovskites with various chemical compositions. The electrochemical performance of the materials was tested through pellet pressing of the perovskite powders. This involved in some case a time consuming preparation process. Furthermore the technique should show the adequate reproducibility. In this work we show the development of the method, which was further used to compare the activity of various electrocatalysts (Figures 1, 2). The electrocatalytic activity of all prepared perovskites was tested in 1M KOH at 80 °C, using an ink consisting of potassium exchanged Nafion®. All tests were performed in the potential window 0-700 mV on a glassy carbon electrode. All the tested perovskites were characterized by their overpotential, measured current at 650 mV, obtained kinetic current and Tafel slopes. It was also shown that this technique do not depend on the initial powder electric conductivity which varied by several orders of magnitude, as shown on Figure 3. 