Quantification of discharge products in magnesium oxygen batteries

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Rechargeable magnesium oxygen batteries are promising energy storage systems. However, there are several fundamental and practical issues affecting this battery type, mainly concerning the usage of metallic magnesium as anode in the presence of oxygen, and the re-oxidation of the oxygen reduction reaction (ORR) product(s) [1].
By now several indicators were found that the main discharge product is MgO_2, and some claim to have found MgO as well [2]–[5]. Clarifying the actual discharge product(s) is important to develop strategies to implement the oxygen evolution reaction (OER). In this work, films formed by ORR in two different electrolytes were investigated. A clear result was obtained by a quantitative XPS model (see Figure 1), which allows for the differentiation and identification of discharge products. It will be proven that MgO_2 is the main discharge product in both electrolytes and that side product formation is comparably low [6], [7].

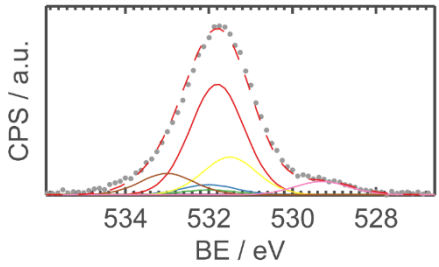

Figure 1: Peak fit of the O(1s) region in an IL based electrolyte

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