**Bachelor thesis:**

**Thesis description:**

The oxygen reduction reaction (ORR) and the reverse oxygen evolution reaction (OER) are two fundamental electrode reactions, which are highly important also in the context of renewable energy concepts based on H₂ (fuel cells, water electrolyzer). Main problem of these reactions is that they are both highly affected by kinetic limitations, which result in significant overpotentials and thus a considerable loss of efficiency.

Objective of the present thesis is to gain further insight into the reaction mechanism and the fundamental effects responsible for these limitations by exploring the influence of a single experimental parameter, in this case the pH of the electrolyte, on the reaction kinetics, keeping other parameters fixed. The experiments will be performed in a beaker cell under well-defined mass transport conditions (rotating disc electrode), recording the potential dependence of the steady-state currents for the ORR and the OER on a Pt electrode at various electrolyte pH values (1 – 14) at constant ionic strength. A detailed analysis of the kinetic data will be conducted, e.g., by means of a Tafel analysis.

Overall this thesis project offers the possibility to i) acquire good practice in model electrochemical measurements, to ii) apply fundamental electrochemistry data analysis and to iii) deal with fundamentals of electrocatalytic reactions relevant for practical applications.

**Target group:** Bachelor students in Chemistry / Business Chemistry

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