

Bachelor- or Masterthesis (German or English)

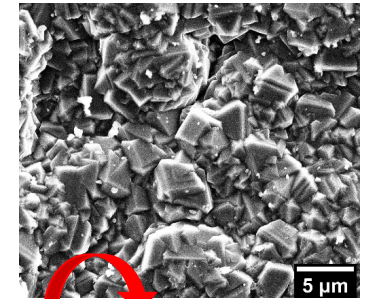
Topic: Influence of porous substrates on the performance of diamond electrodes in electrochemical applications

Start: at any time

Description: **Boron-doped diamond** (BDD) is a versatile material for electrochemical applications, primarily due to its wide potential window. This characteristic facilitates the formation of strong oxidizing agents (e.g. hydroxyl radicals: HO•) before the formation of O₂. HO• can effectively target and remove various pollutants from aqueous solutions. Despite its outstanding ability in pollutant degradation, the use of diamond electrodes in **water treatment** is limited due to the production of potentially **harmful by-products**. Therefore, effective water treatment technologies utilizing diamond require a reliable strategy for controlling the formation of these by-products.

To optimize diamond electrodes for these applications, it is crucial to carefully adjust its properties, along with the electrode design and the associated fluid dynamics. By doing so, it is possible to influence the various reactions that occur during the water treatment process. Furthermore, BDD not only enables the anodic oxidation of pollutants but also potentially enables the direct **reduction** of the by-products formed in these reactions.

The primary objective of this research is to investigate diamond-based electrode systems with a focus on **minimizing or avoiding** harmful by-products while maintaining oxidation efficiency. This work will concentrate on the oxidation of chloride ions to the harmful ions chlorate and perchlorate, which can be detected by ion chromatography. In particular, the resulting species will be influenced by changing the **electrode and cell design**.



Methods: Sample Preparation, CVD-diamond synthesis, Ion Chromatography, UV-Vis Spectroscopy

Location: Erlangen

Supervision: **Carolin Messerschmidt** carolin.messerschmidt@fau.de

Responsible Professor: Prof. Rosiwal



The supervisor can also provide information on other prospective topics in the fields of diamond coating and electrochemical applications of CVD diamond.