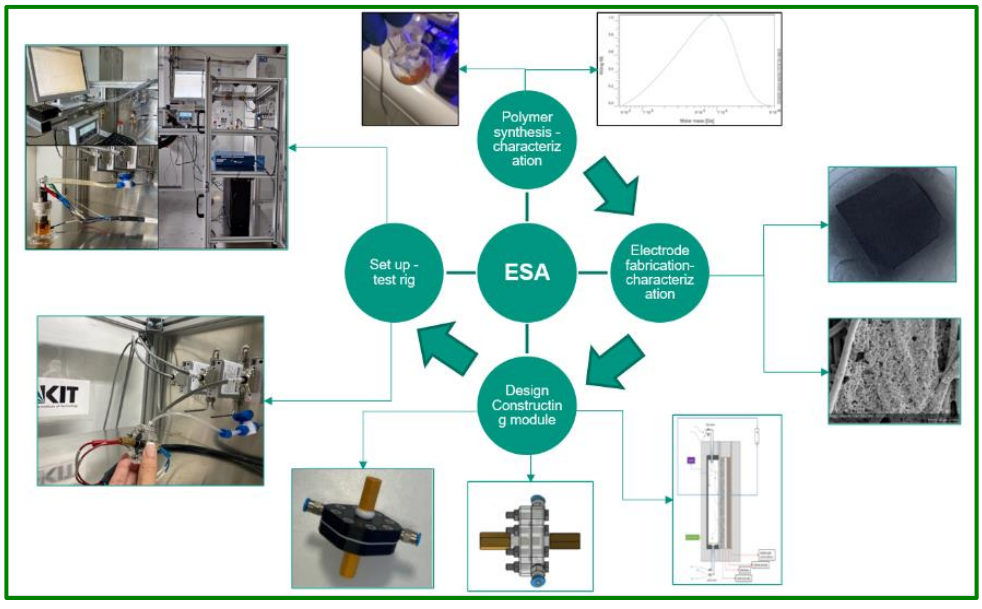
Study the electrochemical behavior of fabricated electrodes for Direct Air Capture

Background and Motivation:

The development of sustainable Direct Air Capture technologies is critical to solve the global warming problem as the increasing the amount of emitted carbon dioxide in the atmosphere is one of the main factors for more than half of the global warming variance. Therefore, it became the main target of GHG capture research recently. Thus, fast mitigation of greenhouse gases emissions has been one of the most urgent scientific problems in the global arena over the last decades. To this end, capturing carbon dioxide not only from the point source is important but also the trapped one in the atmosphere is quite urgent and necessary. Direct air capture (DAC) is a carbon dioxide removal technology which separates CO_2 directly from the air using an engineered system. As it is known, the concentration of CO_2 in air is ultra-diluted which makes this technology be challenging especially in presence of high concentrations of dioxygen and water in air.

My project in IMVT is focused on DAC technology through designing and preparing the module based on Electro-Swing Adsorption method. Therefore, the module and the test rig is setup to evaluate the Adsorption – Desorption performance. One of the important factors is the electrochemical behavior of the electrode such as Charge/discharge cycle and other electrochemical behavior of electrochemical cell.

This position is aimed at students from the faculties of chemical engineering, electrochemistry and chemistry, here at KIT.



Tasks:

1. electrode fabrication for CO_2 capture and release through using appropriate coating technique such as dip-coater, inkjet printer and spray coater.

2. characterization: The electrodes shall be characterized for their structure and morphology, conductivity, adsorption capacity, and electrochemical performance.

Conditions:

- Students of chemical engineering / process engineering / chemistry or electrochemistry
- Language: German or English

Start: by arrangement

Supervisor: Mohanna Hosseini

Email: (Seyedehfatemeh.hosseini@kit.edu)

Phone: +49 721 608-26754

Web: https://www.imvt.kit.edu/1011_1944.php