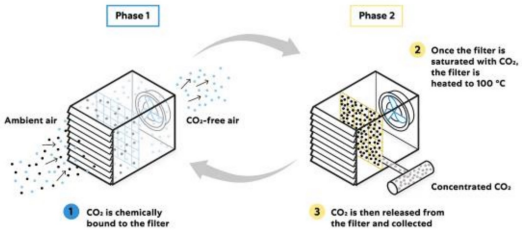
Investigation of performance parameters of various sorbents used for Direct Air Capture of CO_2

Topic suitable for Master Thesis (Bachelor Thesis)

Direct air capture (DAC) technology proposes to capture and remove CO_2 from ambient air to reduce the impact of emissions from dispersed point sources such as homes and cars and provide pure CO_2 for industrial feedstocks. The technology is still in the midst of R&D and needs to be optimized at various stages of operation. From the energy required for CO_2 capture to the emissions generated by the technology itself, it needs to be evaluated and improved. The type of sorbent - solid or liquid - and the operating mechanism determine the DAC process in terms of energy requirements and efficiency.



Ambient air is drawn in via fans and flows through a highly selective filter material to which the CO2 molecules adhere. Once the filter is saturated, it is heated and can then be discharged from the filter as a pure gas. (Graphic: Climeworks)

CEET is pioneering the development, optimization and application of functional materials for energy conversion and storage technologies. Given the continued interest in the emerging field of carbon dioxide DAC, it is expected that DAC could make an important contribution to the achievement of the global NET-ZERO targets.

This master's project will evaluate the properties and performance of various sorbents that have been studied for CO_2 capture from simulated air. The performance metrics of the sorbents are the key input parameters for mathematical tools such as MCDM and LCA to provide an overview of the feasibility and implementation of DAC at a larger scale.

Tasks:

- Literature research and collection of relevant performance parameters of DAC systems.
- Familiarization with mathematical tools of data analysis like MCDM, and LCA and applying tests for the identified data.
- Evaluation and interpretation of the test results complying with an acceptable DAC set-up.

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