Project title – Mini-Astérix : TSA vs VTSA

Context:

The technology developed at the EPFL Carbon team is based on a hybrid technology setup, with a first stage of adsorbents, and a second stage composed of a graphene membrane setup. The adsorbents are use in a low energy Temperature Swing Adsorption (TSA) process which allows us to concentrate CO2 from 0.04% in the atmosphere to 1%. This enriched feed is then passed onto the membrane stage for further purification up to 95%.

The value of this hybrid approach is based on various hypothesis which would yield an efficient direct air capture system. To validate that this approach is less energy consuming than the traditional Vacuum Temperature Swing Adsorption (VTSA) processes developed by companies such as Climeworks, we want to directly compare commercial adsorbents' performances in TSA vs VTSA.

Description:

For this you will be able to continue the work done in the past semester students who developed a modular mini version of our large-scale DAC prototype, Asterix. It is equipped with pressure, temperature and humidity sensors which will enable the precise measurement of the adsorbent's performance. This project will involve the design of a new module which will allow for the usage, or not, of a vacuum pump.

Requirements:

- Some knowledge in mechanical engineering, thermodynamics & fluid mechanics
- Electronic circuit design & Arduino
- Fast mechanical prototyping
-Bonus: LabView and welding experience would be a strong plus, independence and good communication would be also greatly appreciated

Contact:

If you are interested or have an more questions, send us an email at contact@epflcarbonteam.ch -> We'll get back to you as soon as possible!

Remarks:

You will work in close collaboration with the Chemistry team of the EPFL Carbon team and the previous members that built the mini prototype, as to choose adequate commercial adsorbents and accelerate your development phase.