MASTER THESIS PROJECT:

Enzyme reactor - Formic acid to methanol conversion by enzyme-driven catalysis

BACKGROUND:

Enzyme catalysis supported on porous support has many advantages to other catalytic processes. The enzyme catalysis is an effective and pure process due to that the enzymes are 100% specific to each reactant, i.e. no molecules are adsorbed. The enzyme stability can be greatly improved compared to that of enzymes in solution when mounted onto a porous support. No elevated pressure, temperature, dangerous chemicals or precious metals are needed for this process. The reduction of formic acid to formaldehyde and methanol can be achieved by alcohol oxidases or alcohol dehydrogenases. In this Master thesis, the reduction of formic acid to formaldehyde and methanol will be considered. The thesis will include the following parts: Selection of suitable enzyme for formic acid to methanol reaction, Immobilization of enzyme/s onto inorganic support, building an enzyme reactor and connecting reactor to electric circuit, analysing reaction products.

Ceguma AB is a start-up company with mission is to contribute significantly to the global lowering of greenhouse gas emission within the next 10 years by developing enzyme based CCU technology. One important milestone for the company is to develop a demonstrator - an enzyme based reactor. This Master's Thesis is an exciting possibility for a skilled and ambitious student to contribute to achive skills in new enzyme-based technology.

AIM:

To construct an enzyme reactor comprising an enzyme immobilized onto porous amorphous aluminum oxide and prove conversion of formic acid to methanol.

DESIRED EDUCATION: Master's Programme in Applied Biotechnology, Master's Programme in Molecular Biotechnology Engineering Programme, Bio and Nano Materials - Master's Programme in Chemistry

LOCATION: Uppsala Biomedical Centre/Ångström Laboratory

PROJECT START: January 2023

SUPERVISORS: Prof. Gunnar Johansson (gunnar.johansson@kemi.uu.se), Prof. Mats Boman (mats.boman@kemi.uu.se)

Send in your application (CV and personal letter) to:

info@ceguma.com

[1] Jackson RB, et al. (2022). "Global fossil carbon emissions rebound near pre-COVID-19 levels". Environmental Research Letters. 17 (3).

[2] I. Ganesh, Renewable and Sustainable Energy Reviews 31 (2014) 221-257.