Introduction to Exploratory Projects – Ongoing

In addition to deep research into high-risk, high-impact fundamental science and technology, GCEP also funds smaller exploratory efforts. These exploratory projects can be funded for up to one year, and have budget limits of up to $100,000 each. The goal of these projects is to quickly evaluate the feasibility of a novel concept. If such an investigation proves successful, the investigators may apply for regular GCEP funding. One exploratory project is currently being funded.

Professor Spormann leads an effort to engineer a microbial platform for conversion of biologically produced methane and syngas to biofuels and industrial chemicals. Converting one-carbon compounds to multi-carbon compounds is a challenge in non-biological catalysis. However biological systems are capable of this reaction and the microorganism, *M. acetivorans* C2A is a unique microorganism to investigate because it can naturally metabolize CO to methane and acetate. If successful, this technology will provide a means to remove net CO₂ from the atmosphere to utilize syngas to replace petroleum hydrocarbons. So far these researchers have successfully overcome the first hurdle towards achieving this by demonstrating genetic engineering in *Methanosarcina acetivorans* using CRISPR interference (CRISPRi). They are developing a promoter library and a ribosome binding site (RBS) library in order to control gene expression and streamline metabolic engineering in this organism. The goal is to enhance multi-carbon product production in *M. acetivorans* C2A. CO and methane will be the starting point to make acetate, demonstrating the transformation of a one-carbon compound to a two-carbon compound and a novel fermentation.