POC-4-zhang-C1net-public-summary-application

Industrially-driven discovery of C1-utilising microorganisms

PI Ying Zhang, University of Nottingham

Modern society relies heavily on petrochemicals, derived from fossil fuels, for fuels such as petrol and diesel and chemicals such as plastics. The dwindling stocks of these fossil fuels linked with political uncertainties surrounding their extraction and delivery mean that alternatives must be found. In addition, since the industrial revolution, levels of carbon dioxide (CO_2) and methane (CH_4) in the atmosphere have been increasing and these gases are the key contributors to global climate change; additionally, levels of carbon monoxide (CO) are also increasing. Industrial biotechnology projects have two interlinking aims, reducing our reliance on fossil fuels and greenhouse gas emissions; our project aims to deliver by utilising waste gases in the production of key fuels and chemicals.

Most work in this area use bacteria in this conversion of waste gas to useful product. We predict that we can isolate new versions of these bacteria by sampling environments that are contaminated with the waste gases, such as steel mill off-gas for carbon dioxide and carbon monoxide, and landfill for methane. Bacteria living in these environments will be better adapted for growth in gas in the laboratory. After isolation, we will characterise these new bacteria by looking at how well they grow and whether they produce any useful chemicals, and make the most promising species available for C1Net members. In order for this process to compete with current industrial production of fuel and chemicals, the bacteria must be engineered to make them more efficient. This manipulation relies on knowing their entire DNA code, the genome. Up to twelve isolates will be chosen for full genome sequencing, after which scientists can begin to work on the use of these bacteria for the efficient production of useful fuels and chemicals.