 

MIB secures major EU consortium grant (€3.7M) with European partners to develop photosynthetic microorganisms that catalyze direct conversion of solar energy and carbon dioxide to engine-ready fuels.

The DirectFuel consortium brings together European and US expertise in enzymology, systems biology and synthetic biology to develop photosynthetic microorganisms that catalyse direct conversion of solar energy and carbon dioxide to engine-ready fuels. The Manchester component is led by Prof Nigel Scrutton (MIB Director) and Prof David Leys (both members of the Manchester Enzymology Group). The Manchester group will provide novel components to construct novel biochemical pathways and create new photosynthetic strains that would allow low-cost production of transport fuel in a potentially neutral 'greenhouse gas' emitting process that does not compete for agricultural land. Read more (public abstract below)

DirectFuel Public Abstract

The objective of the DirectFuel project is to develop photosynthetic microorganisms that catalyze direct conversion of solar energy and carbon dioxide to engine-ready fuels. A key process target of the proposal is 'direct' in the sense that fuel production should not require destructive extraction and further chemical conversion to generate directly useable transport fuels. To further increase our chances of delivering a functioning process we target only non-toxic end-products that have been demonstrated to function in existing or minimally modified combustion engines. From the above criteria, we have chosen to develop an exclusively biological production process for the volatile end-products ethylene and short-chain n-alkanes ethane and propane in photosynthetic
cyanobacteria. As no natural biochemical pathways are known to exist for short-chain alkane biosynthesis, we first identify potential gene candidates through informatics analysis and then tailor the substrate specificities of the encoded enzymes by enzyme engineering. In order to directly capture solar energy to drive fuel biosynthesis, the synthetic pathways are at first assembled in the photosynthetic model organism Synechocystis sp. PCC 6803. It is highly unlikely that mere 'introduction' of novel biochemical pathways will result in high-yield synthesis of desired end-products. The final key step is therefore to optimize native host metabolism to deliver reducing energy and metabolic precursors to the synthetic pathways with maximum metabolic flux. Successful construction of the intended strains would allow low-cost production of transport fuel in a potentially neutral 'greenhouse gas' emitting process that does not compete for agricultural land. The proposed project is highly relevant to the call as we construct "new metabolic pathways" that catalyze "direct" production of "gaseous fuels for transport" "directly from solar radiation".