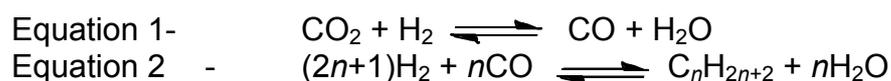


Lay Statement: Catalyst Design and Synthesis for the Conversion of Carbon Dioxide into Commodity Chemicals

Carbon Dioxide (CO₂) emission has increased continually for the last 150 years leading to many negative environmental effects, such as global warming. In order to begin to counteract these problems the amount of CO₂ released into the environment must be reduced. This can be done either by a limiting overall CO₂ production or by the capture of CO₂ before its release into the atmosphere. The large volume of CO₂ begin produced combined with legislation requiring limits on the amounts released into the atmosphere make it a very attractive chemical feed-stock.

This Project focuses on the development of a range of catalysts that can be used for the conversion of this cheap and widely available gas into a various valuable commodity chemicals. The scope of the possible products is wide and ranges from hydrocarbons to plastics.

Hydrocarbons can be produced from this feedstock through two main reactions. First, the reverse water gas shift (RWGS) reaction which reduces the highly stable CO₂ into the more reactive carbon monoxide (CO) as shown in Equation 1. The second reaction then converts this newly formed CO into hydrocarbons of varying length via the Fischer Tropsch process, shown in Equation 2.



Iron and cobalt based catalysts are being developed to catalyze both the RWGS reaction and the Fischer Tropsch process in the same step with the eventual aim of producing a carbon-neutral fuel.

Homogeneous catalysts are also being developed for the conversion of CO₂ into the plastics. CO₂ can either be reacted with an epoxide to produce polycarbonate or CO produced through the RWGS reaction can be reacted with ethene to produce polyketones as shown in scheme 1.

