CO_2 electroreduction to fuels and chemicals for a circular carbon economy

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Abstract

Reduction of CO_2 primarily aims at producing valuable chemicals and fuels – particularly renewable fuels – in which renewable energy (e.g., solar) can be stored. At large scale, CO_2 conversion could contribute to the development of a circular carbon economy.

We have developed molecular catalysts capable of converting CO_2 under photochemical, electrochemical, or combined conditions. These systems can achieve high selectivity through fine tuning of both the metal center and the second- and third-coordination spheres of the ligand. Such catalysts can be designed to produce a full range of C1 products, including formaldehyde, methanol, and methane,[1-6] as well as C2+ products and more complex molecules such as sugars.[7,8]

Recent results will be presented, along with our efforts to translate laboratory discoveries into scalable technologies.

References

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Keywords

CO_2-to-fuels ; Electrocatalysis ; CO_2 electrolyzers ; Solar fuels ; Methanol