Bi-functional Catalyst and its Catalytic Distance Effect for Carbon Dioxide Hydrogenation to Liquid Fuels

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Liquid fossil fuels such as gasoline, diesel, and jet fuel account for more than 96 % of the current energy supply to the transport sector. Consequently, CO_2 emissions from using these fuels have led to serious global warming problems. The catalytic process of converting CO_2 back to liquid fuel can be an important solution to solve global warming and environmental problems. Compared to CO-FT synthesis, CO_2 hydrogenation for the production of high-molecular-weight liquid fuels is much more difficult. The conversion of CO_2 to long-chain hydrocarbons is a series reaction via the RWGS reaction to produce reactive CO. Long-chain hydrocarbons are then produced through typical CO-FT synthesis and isomerisation reactions. The activity of CO_2 hydrogenation is controlled by the rate determining step of the chain growth reaction, which is limited by a low concentration of CO (the main chain growth agent) during the reaction. Moreover, RWGS generates water, an undesirable by-product that deactivates the catalyst. In this presentation, a one-pot catalyst performs both reaction in a sequence, and produces C_{5+} hydrocarbons with high CO_2 conversion rate.