



Methane–Carbon Dioxide: Conversions to Syngas and Hydrocarbons

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This monograph describes the new innovation that has recently been developed for the CH₄–CO₂ conversions process. Optimization of CO₂ reforming of methane to synthesis gas with the help of experimental design, empirical modeling and ANN modeling are developed for CORM in presence of oxygen. An overview on dynamic equilibrium analysis has shown that an increase of sweep factors induced more significant enhancement hydrogen permeation than permselective area. The NiO/CeO₂ catalyst showed potential as catalyst for the CORM. The application of a hybrid catalytic DBD plasma reactor has the potential for the co-generation of C²⁺ hydrocarbons and synthesis gases from methane and carbon dioxide. Carbon dioxide as co-feed has important effects on the carbon suppression. It can be concluded that three factors, i.e. CH₄/CO₂ feed ratio, total feed flow rate, and discharge voltage, in the DBD plasma reactor system have significant effects on the reactor performance. The hybrid catalytic DBD plasma reactor is more suitable for CO₂ OCM process than the conventional catalytic reactor over CaO–MnO/CeO₂ catalyst. Further innovation and improvement of current research on CH₄ and CO₂ are required to increase conversion and selectivity and to commercialize the process.



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