

Valuable hydrocarbons from methane via catalytic & noncatalytic ways

하경수[†], 김만중, 김주찬, 정재권, 배영광, 전종현
서강대학교
(philoseus@sogang.ac.kr[†])

Valuable hydrocarbons such as ethylene, acetylene, aromatics and hydrogen could be synthesized via a non-thermal plasma bed and a thermochemical catalytic bed. In the first reaction step, a dielectric barrier discharge (DBD) plasma reactor was employed for non-oxidative coupling of methane. The coupling reaction in the DBD plasma bed was conducted near atmospheric pressure and room temperature. This non-catalytic reaction system could successfully activate C-H bond to produce methyl radicals and light hydrocarbons. The existence of maximum conversion at a specific gap distance was experimentally observed and could be described successfully by using a newly developed concept of micro-electrodes. It seemed quite possible to control the compositions of ethane, ethylene, and acetylene by properly adjusting the size or the gap distance of particles. The obtained C₂ chemicals could be fed into the second thermochemical reactor, where aromatization take place. With novel hierarchical zeolite-based catalysts, the effects of structural difference as well as the Si/Al ratio were scrutinized.