

The synthesis of light hydrocarbons by a nonthermal plasma method

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Valuable chemicals such as light hydrocarbons, syngas and hydrogen could be synthesized via a non-thermal plasma bed. A dielectric barrier discharge (DBD) plasma was employed for non-oxidative coupling of methane, reforming and hydrogenation. The coupling of methane was conducted near atmospheric pressure and room temperature. This reaction system could successfully activate C-H bond of methane to produce methyl radicals and light hydrocarbons. In addition, a macroporous silica and TiO₂ nanoparticle-impregnated macroporous silica catalysts were employed in a DBD plasma reactor. This catalytic system could reduce the rate of deactivation. The selectivity of ethane could be increased by incorporating TiO₂ nano-crystallites. This selective production of ethane could be applied to various types of commercial ethane cracking centers, and consequently the yield of ethylene could be greatly increased.