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Catalytic Non-Oxidative Catalytic Conversion of Methane to Hydrocarbons

A stable, non-oxidative catalytic process efficiently converts abundant methane resources into high-selectivity hydrocarbons and hydrogen byproducts for use in plastics and resins.

Methane, the main component of natural gas, is an abundant fossil fuel resource, widely distributed around the globe. The abundance of methane on Earth makes it an attractive alternative source for energy and chemicals instead of petroleum. Catalytic transformation of methane to value-added chemicals such as ethylene, benzene, methanol, and formaldehyde plays an important role in methane utilization. Various methods have been considered for the conversion of methane to higher hydrocarbons and oxygenates because of its potential for a wide range of products (e.g. plastics, resins); however, over-oxidation of CO/CO2 has been a challenge, while non-oxidative conversions of methane result in unavoidable coke formation and limited catalyst lifetime. There is need of a method for the conversion of methane with high selectivity.

Researchers at Purdue University have developed a method for producing hydrocarbon and hydrogen from methane using a tubular reactor. This catalytic process is non-oxidative and produces hydrocarbons with high selectivity (greater than 90 percent) without CO2 formation, while hydrogen is generated as a byproduct. The catalysts exhibit stable performance with no deactivation observed over an 8-hour test. This technology would be used to convert a widely abundant resource into precursor components for a broad variety of products such as plastics and resins.

Advantages:

-High selectivity

-Stable

-Long lifetime

Potential Applications:

Technology ID

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Category

Chemicals & Advanced Materials/Specialty & Performance Chemicals
Chemicals & Advanced Materials/Green & Bio-Based Chemistry
Energy & Power Systems/Hydrogen & Fuel Cell Systems

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-Plastics

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