

Oxidative Coupling of Methane Using Catalysts Prepared by Solution Combustion Method

A novel solution combustion synthesis method creates high-quality, long-lasting, and easily manipulated catalysts for the lower-energy conversion of methane to ethylene with fewer side products.

Many uses for methane, the primary constituent of natural gas (>95%), are being explored as natural gas becomes a larger part of the global energy economy. One major use of methane is in the creation of ethylene. Ethylene is a critical starting material in many industrial applications including polyethylene, a widely used plastic; detergents; car antifreeze; and styrene. Current methods for production of ethylene from methane involve high temperatures that require a large amount of fuel, and consequently, emit the most carbon dioxide of any commodity chemical product. The use of catalysts has been explored, but the catalysts produced by conventional methods deactivate over time.

Researchers at Purdue University have developed a method of producing these catalysts using solution combustion synthesis that produces homogenous catalytic material that remains active in the conversion of methane to ethylene. This process creates catalysts of uniform desired composition that minimizes problems from loss of active material during the reaction. The composition of the catalyst can easily be manipulated to obtain the optimum formulation. Catalysts produced this way allow a lower energy conversion of methane to ethylene with less undesired side products for a longer time than conventionally produced catalysts.

Advantages:

- High quality catalysts of homogenous composition that remain active longer
- Easy to manipulate composition to determine optimum formulation of catalyst

Potential Applications:

Technology ID
2013-VARM-66333

Category

Chemicals & Advanced
Materials/Specialty &
Performance Chemicals
GreenTech/Carbon Management
Energy & Power Systems/Power
Generation

Authors

Ranjita Ghose
Hyun-Tae Hwang
Arvind Varma

Further information

Will Buchanan
wdbuchanan@prf.org

View online



-Ethylene production from methane

-Alternative uses of natural gas

-Industrial applications such as plastics, detergents, antifreeze, and styrene

TRL: 4

Intellectual Property:

Provisional-Patent, 2012-08-20, United States | Utility Patent, 2013-08-20,
United States

Keywords: Methane conversion, ethylene production, solution combustion synthesis, homogenous catalysts, high quality catalysts, catalyst formulation, natural gas use, low energy conversion, chemical process, industrial applications, Catalyst, Chemical Engineering, Energy Efficient, Ethylene, Fuel Cells, Natural Gas