

TECHNOLOGY OPPORTUNITY

EFFICIENT PROCESS FOR CONVERTING METHANE TO SYNGAS

OPPORTUNITY:

Research is active on a method to convert methane into synthesis gas using mixed metal oxides. The resulting syngas could be used to manufacture more valuable chemicals. This technology is available for licensing and/or further collaborative research from the U.S. Department of Energy's National Energy Technology Laboratory.

CHALLENGE:

Natural gas (NG), which is composed primarily of methane, is one of the most abundant, low-cost carbon-containing feedstocks available. The economically available route to produce valuable chemicals from methane is via synthesis gas followed by different chemical routes to manufacture the desired chemicals. In a large-scale industrial plant, the production of syngas accounts for a large part of the total costs. Therefore, it is important to develop more efficient and cost-effective methods for the conversion of methane to syngas.



OVERVIEW:

Researchers at NETL have developed a process for methane partial oxidation that uses mixed metal oxides to produce syngas. The mixed metal oxide has unique characteristics that allow it to partially oxidize methane to produce syngas without combusting the methane. After the partial oxidation reaction with methane, the mixed metal oxide can be regenerated with air for continued reactions. The syngas stream from partial oxidation of methane is not diluted with nitrogen. This NETL methane conversion process offers multiple advantages over conventional technologies.

ADVANTAGES:

- More energy-efficient than current methane-to-syngas conversion processes like steam methane reforming
- Overall reaction is exothermic
- Yields syngas with a hydrogen/carbon monoxide ratio of 2:1, which is useful for chemical production
- Methane and oxygen are not mixed because the syngas production of methane with the mixed metal oxide and air oxidation of reduced mixed metal oxide occur at different reactors.
- An air separation unit is not required to obtain a syngas stream undiluted with nitrogen as in traditional methane partial oxidation process
- Metal oxides used are environmentally safe

(continued)



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APPLICATIONS:

- Syngas production from methane
- Production of valuable chemicals from methane
- Hydrogen production from methane

PATENT STATUS:

- U.S. Non-Provisional Patent Application No. 15/497,708
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"Metal Ferrite Oxygen Carriers/Catalysts for Partial Oxidation of Methane for Production of Synthesis Gas"
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