Nanocatalysts for conversion of natural gas to liquid fuels and petrochemical feedstocks

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ARTICLE INFO

ABSTRACT

The conversion of natural gas (methane) as an alternative to petroleum into valuable chemicals and clean fuels has received much attention. However, because of high stability and symmetry of methane molecule, relatively few number of natural gas conversions, mostly indirect routes, have been commercialized and the remainders are still not competitive to petroleum-based processes and are in research and development stage. With the advent of nanocatalysts in chemical processes and energy sector, the potentials of these catalysts in natural gas conversions have been studied extensively all around the world. In indirect conversions, especially gas-to-liquid (GTL) technologies, effective nanocatalysts have been developed. However, in direct conversions, further research and development works are necessary. In this work, the advances in application of nanocatalysts in natural gas conversions are reviewed and areas for further research are addressed. Both theoretical aspects such as density functional theory (DFT) and characterizations and practical achievements in scientific and patent literature will be considered.

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1. Introduction

Natural gas (methane) is considered as an alternative to petroleum for production of chemicals and clean liquid fuels. Natural gas has several advantages over petroleum as a feedstock. Its

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