QU research team innovates ways to synthesize new nanocatalysts

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A research team from the Gas Processing Center (GPC) at Qatar University College of Engineering (QU-CENG) synthesized new nanocatalysts and improved existing ones via modern preparation techniques.

The team used bulk and surface sensitive analytical tools to fully characterize the nanocatalysts. Catalysts are materials employed to reduce the energy required for chemical reactions and accelerate their speed. Catalysts do not consume during reactions and stay with full activity for several years. This project aims to obtain zero emission of unburned natural gas from engines fueled with natural gas.

"It is worth mentioning here that the greenhouse effect of methane (main component of natural gas) is more than 20 times worse than that of carbon dioxide," GPC Research Professor Dr Mahmoud Khader said.

He added: "We have synthesized a novel nanocatalyst via an economical, one-step preparative methodology called "Solution Combustion Synthesis (SCS)". The new SCS methane oxidation catalyst is made of solid solution mixture of palladium oxide and ceric oxide supported on aluminum oxide. The catalyst can oxidize extremely small amount of natural gas in the exhaust of any engine, therefore, reduce natural gas emission."

Dr Mahmoud Khader noted that steam reforming is the reaction between methane and water vapor to produce hydrogen (and carbon monoxide as

well as carbon dioxide). He said: "SRM is the main source for industrial hydrogen generation. The present invention will solve some problems associated with the existing industrial methane steam reforming catalysts."

He added: "This reaction aims to produce synthesis gas (Syngas) (hydrogen and carbon monoxide mixture). The DRM is the reaction between carbon dioxide and methane. The resulting syngas can be a useful raw material for various petrochemical processes such as Fischer-Tropsch synthesis and for the production of useful products, e.g. ammonia, urea and methanol. We developed a novel nickel based nanocatalyst which showed to be resistant and stable for the CO2 reformation of methane."

Provided by Qatar University

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