LICENSING & PARTNERING OPPORTUNITY

Qatar Foundation's Office of Industry Development and Knowledge Transfer (IDKT)

مؤسسة قطر
Qatar Foundation

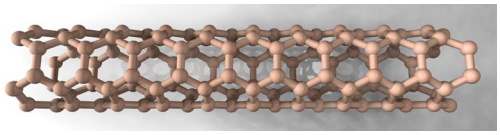
A Two-Reactor Process for Conversion of Greenhouse Gases to Multiwall Carbon Nanotubes and Syngas

Addressing Soaring Carbon Emissions

Rapid increase in the world's greenhouse gas (GHG) emissions has resulted in an extensive look-out for new technologies that address this challenge. Natural gas reforming is an important building block that presents an opportunity to re-insert GHGs like CO_2 and CH_4 into products like synthetic fuels, alcohols, and others. Qatar Foundation's CARGEN™ technology presents a novel pathway for natural gas reforming that addresses the GHG emissions while converting them to a solid and environmentally sustainable product called multiwalled carbon nanotubes (MWCNTs).

A Novel and Impactful Solution

The novel CARGEN technology converts GHG emissions comprising CO_2 and CH_4 to MWCNTs and synthesis gas (Syngas). It produces solid carbon from CO_2 and volatile organic compounds such as methane, and a second reactor produces syngas from the gases produced in the first reactor. Not only can the process reduce GHG emissions, but it also can produce high-quality MWCNTs at much lower prices than currently available.



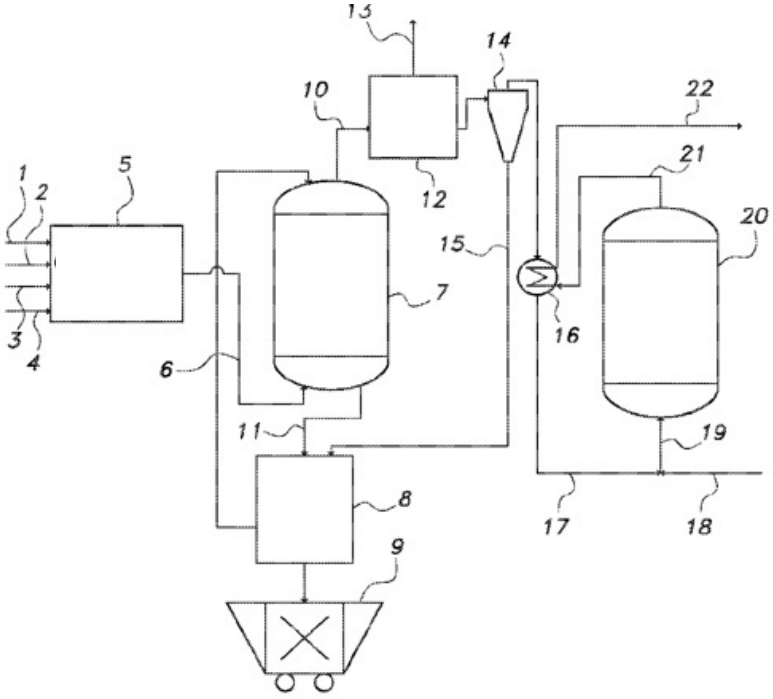
APPLICATIONS

- MWCNTs can be used to produce re-inforced rubber for tires and can also be used for cement, carbon re-inforced polymer fibers, steel, asphalt, batteries, fuel cells, solar photovoltaics, etc
- Extremely light and strong composites for aerospace and defense industries
- Syngas production for gas-to-liquid (GTL), hydrogen, and methanol industries

Solution Advantages

Qatar Foundation's two-reactor process offers many advantages over other natural gas reforming methods.

- **Synergistic:** Decreases the net energy requirements involved in producing two valuable end products by utilizing an efficient, two-reactor design
- **Reduces CO_2 emissions:** Provides a process (via another CARGEN patented technology) to regenerate the deactivated catalyst using CO_2, which further aides in reducing overall CO_2 emissions during both operation and regeneration cycles of the process
- **Added value:** Produces high-purity MWCNTs ranging from 50 to 100 nm in diameter and up to 30 micrometers in length that meet the quality standards for improving material strength and electrical and thermal properties of end products
- **Economical:** Requires fewer conversion steps than other reforming technologies and results in more affordable MWCNTs without sacrificing quality
- **Improved:** Out-performs benchmark natural gas reforming technologies, most of which use carbon monoxide rather than CO_2 as a feed gas and do not produce syngas
- **Experimentally proven:** Enables at least a 50% reduction in energy requirements compared with dry reforming of methane while converting at least 65% of CO_2 feed gas



Qatar Foundation's two-reactor process. Reactions in the CARGEN reactor are conducted in a limited-oxygen atmosphere, using CO_2 and VOCs such as methane to produce MWCNTs . The reformer reactor can use dry, steam, and/or partial oxidation reforming to produce syngas.

Tech #: QT-2017-017
QT-2019-082
QT-2021-028

PATENT STATUS

Patent application US20200109050A1 has published and additional international coverage is pending.

LICENSING OPPORTUNITIES

Qatar Foundation is offering this technology for license. For more information, please contact:

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