UNIVERSITY OF WYOMING
Wyoming Technology Transfer and Research Products Center

Achieving Ultralow Pt Loading in Proton Exchange Membrane Fuel Cell

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Patent Status:
Patent Pending

Description of Technology

Proton exchange membrane fuel cells (PEMFC) are the newest improvements in fuel cell technology that will replace traditional, aging alkaline fuel cells. The main disadvantage with PEMFCs right now is their high cost per kilo watt (kW). The current cost is $55/kW and the target cost is $40/kW by 2020. Current high costs are mainly due to the use of the platinum (Pt) catalyst which accounts for 50% of the cost. So far, many researchers have tried different methods to achieve better results but have had little success. One study has been successful in showing that the use of molybdenum carbide (Mo2C) catalysts in the cathode provides higher oxygen reduction reaction (ORR) activity than what is commercially available. However, Mo2C catalysts have poor stability of carbides at higher potential. Researchers at the University of Wyoming have discovered a way to significantly improve the Mo2C stability by applying Pt nanoparticles to the surface of it. Such optimization of the Pt catalyst may lead to lower costs.

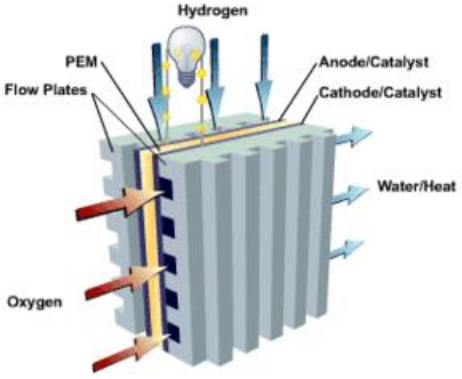
The University of Wyoming Pt/Mo2C catalyst was able to achieve a higher current density and higher maximum power density than the currently commercially available Pt/C catalyst. The maximum power per mass of the Pt was also higher than the proposed target for automobiles by year 2020 set by the US Department of Energy. After some additional testing, it was also shown that the catalyst is durable enough for normal operating conditions.

Applications

The Pt/Mo_2C catalyst has a specific application in proton exchange membrane fuel cells, but in this application it may have a very large impact. Because of the increase in almost every characteristic compared to the commercially available catalysts, this discovery will increase the durability, current density, maximum power density, maximum power per mass, and end of life activity of the PEMFC allowing it to be used in normal operating conditions and bringing it closer to the goal of replacing alkaline fuel cells.

Features & Benefits

- Increased Durability
- Greater maximum power per mass of Pt than what was proposed for 2020 by the US Department of Energy
- Higher current density, maximum power density, and end of life activity than what is commercially available



http://www1.eere.energy.gov/hydrogenandfuelcells/fc_animimation_process.html

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