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Long Durable Pt/MWCNT Nanocatalyst for High Power PEM Fuel Cells

Proton Exchange Membrane Fuel Cells (PEMFCs) provide electricity by using hydrogen as fuel and expelling heat and water as exhaust. PEMFCs are the promising power sources for automotive, stationary and mobile electronics because of their higher power densities and environmental benefits and hence they have attracted enormous interest. Unfortunately, for wide-scale commercialization, this technology must overcome several challenges including three critical barriers: performance, cost and durability. Platinum is frequently used in PEMFCs because it is a highly effective catalyst, however, platinum is expensive - and the loading efficiency is too low to offer cost efficient electrochemically active surface area. The common membrane electrode assemblies for PEMFCs are unstable, resulting in poor durability. The solution to these problems is to increase cost-efficiency by increasing the electrochemically active surface area of the platinum, as well as increase the durability of the electrodes.

Researchers at Arizona State University (ASU) have narrowed down the particle size and evenly distributed the platinum by using Multi-Walled Carbon Nanotubes (MWCNTs). MWCNTs are well known to have extremely high surface area, and very high durability. Combining platinum with MWCNTs has resulted in high power output with a low amount of platinum used. The combined platinum-MWCNT catalyst has also shown significantly high performance and exceptional durability.

Potential Applications

- Vehicles
- Portable electronic devices
- Satellites
- Emergency power systems

Benefits and Advantages

- Platinum cost savings of 30% are achievable.
- 25% improvement in fuel cell power density
- Improved lifetime and durability
- Carbon nanotubes are commercially available in a competitive and growing market.