New jelly substance could replace platinum in fuel cells

October 7 2013

(Phys.org) —A substance made from gelatin could be used to replace platinum in fuel cells, according to research published by University of Birmingham scientists in the Royal Society of Chemistry *Journal of Materials Chemistry A*.

The Birmingham chemists have combined gelatin - the same gelatin that is used to make jelly - with iron and magnesium to create a material that performs almost as well as a commercial platinum catalyst, but is considerably cheaper.

The new material performs so well because the iron and magnesium salts cause the gelatin to foam, creating a sponge-like structure. When this is heated, nanoparticles of a compound called iron carbide form inside the sponge. These nanoparticles can be easily dissolved, leaving tiny holes rather like hollow capsules, in the walls of the sponge. Together, the capsules and the sponge-structure create an extremely high surface area, which is crucial for allowing the gaseous reactants to flow through the fuel cell catalyst.

Fuel cells are used to generate electricity and they do this by combining hydrogen and oxygen. The automotive industry is interested in using fuel cells as a means of powering cars with hydrogen instead of using diminishing fossil fuels. One of the major hurdles to this is that the catalysts used in the fuel cells are made of extremely expensive materials including platinum.

Dr Zoe Schnepp, Birmingham Fellow from the University of Birmingham's School of Chemistry, who led the research, said: 'One of the biggest challenges for materials science is to design sustainable materials. This includes materials made from cheap and abundant resources and also simple and safe manufacturing methods.

'Unlike platinum, which is rare, our new material is made up of the abundant and cheap elements, iron and magnesium. By combining these with gelatin we have made an effective material which shows remarkable performance in generating electricity comparable to a commercial platinum catalyst. The key is that the gelatin material is not only cheap, but it's extremely easy to make.'

Provided by University of Birmingham

Citation: New jelly substance could replace platinum in fuel cells (2013, October 7) retrieved 23 May 2024 from https://phys.org/news/2013-10-jelly-substance-platinum-fuel-cells.html