Spinning technique could help boosting solid oxide fuel cells

Solid oxide fuel cells (SOFC:s) have been around for quite a while and have great potential for clean electricity production. However due to issues with quick degradation of performance and high fabrication cost it has struggled for competitiveness. Now though, with material research aiming to lower fabrication costs the future for the SOFC might be bright.

Climate change is one of the 21th centuries greatest concerns for mankind. The need for clean ways of producing electricity to take over from conventional production methods is urgent. SOFC:s have the possibility for stationary power generation to produce electricity with 60% fuel efficiency with nothing but water as rest product. The main issues that have been holding the SOFC:s back are the degradation of performance and the fabrication cost. One of the more expensive materials in the fabrication process is the nickel, which is used in the anode material for the SOFC. A research project is now launched with the aim to lower the amount of nickel used to cut the fabrication cost.

When fabricating the anode the nickel is bound in nickel oxide, and the standard weight ratio of the nickel oxide for the anode is 50%. Attempts will be made to lower this to 30- and 40%. The issue is that the amount of nickel is crucial for the anode material to have good electrochemical performance, and hence a trade-off usually has to be made between performance and cost. However through using a technique called electrospinning it could be possible to decrease the amount of nickel without affecting the performance too much.

Electrospinning is a method used for fabricating long and thin fibres from viscous solutions. Electrostatic forces form fibres that are deposited on a collector plate. The plates are then put in a furnace for calcination of the fibres. The benefit of using this technique is that it provides lots of chemical reaction sites that are crucial for the performance of the anode.

The first few fabricated anode frameworks have shown good potential when magnified with scanning electron microscope. However the researchers cannot be sure about the performance of the materials until conductivity and porosity tests have been performed. This will be done later this year.

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Preparation of electrospun fibres for solid oxide fuel cell anode at University of Electronic Science and Technology of China

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