Nanoscale Engineering to Power a Greener Future

February 3 2006

Researchers at the University of St Andrews have discovered a new material which could lead to significantly more powerful fuel cells than currently available. The School of Chemistry scientists have found a new electrode material allowing the more efficient direct utilisation of natural gas or biogas (as produced from waste) in fuel cells and which could help achieve voltages up to 40% higher than currently achieved.

The findings, carried out in collaboration with the University of La Laguna in the Canary Islands, are reported in *Nature* (Thursday 2 February 2006).

Such an increase in voltage would lead to a similar increase in electrical energy obtainable from a specific volume of natural gas or biogas. As well as enhanced voltage, these new electrodes provide highly competitive performance with conventional state of the art electrodes.

Scientists believe future generations will use fuel cells to power everything from handheld electronic devices to cars and buildings. The global market for fuel cells and hydrogen technology is estimated to be worth $20 billion by 2011.

The work was carried out by Professor John Irvine and Drs Juan Carlos Ruiz-Morales, Jesus Canales- Vazques, Cristian Savaniu and Wuzong Zhou.

Professor John Irvine believes the findings illustrate a significant step forward in the development of fuel cells to reduce CO_2 emissions through the utilisation of renewable fuels such as biogas that are close to CO_2 neutral in their environmental impact.

The new materials were developed through a carefully directed programme of study to control and manipulate their structure on the nanoscale. The radical new approach involved the introduction of nanometer thick layers through control of composition and then directing the composition to the point where these layers became disrupted, but retained their activity.

Early dramatic proof that this approach was likely to be successful came from measurements of the resistance under mildly reducing conditions, where it was discovered that disruption of the defect layers yields an enhancement in the electrical conductivity by a factor of 100,000.

Source: University of St Andrews

Citation: Nanoscale Engineering to Power a Greener Future (2006, February 3) retrieved 2 May 2024 from https://phys.org/news/2006-02-nanoscale-power-greener-future.html