Nanotechnology

Reports from University of Szeged Advance Knowledge in Nanotechnology

2011 FEB 4 - (VerticalNews.com) -- "Conducting polymers are getting more and more interest as both supporting matrixes and electrocatalysts in the oxygen reduction reaction (ORR). A polypyrrole-magnetite nanocomposite layer has been synthesized by using potassium tetraoxalate as the conducting electrolyte," scientists writing in the *Journal of Physical Chemistry C* report. "FT-IR measurements proved that chemical modification of the iron oxide by a reaction between the nanoparticles and the salt-leading to an iron oxalate layer on their surface-endows a negative charge to the particles, which leads to their penetration into the polymeric film as a part of the charge compensation. The new hybrid material showed significant photoelectrocatalytic behavior in the ORR. The ratio observed between the stabilized stationary currents under and without illumination is 2.0 for this hybrid. Separate studies on the electrochemical decomposition of H2O2 also indicated an enhanced catalytic activity of the polypyrrole/magnetite hybrid compared with the neat polymer," wrote C. Janaky and colleagues, University of Szeged. The researchers concluded: "The results may open new opportunities in the next generation of solar fuel cell applications." Janaky and colleagues published their study in the *Journal of Physical Chemistry C* (Visible-Light-Enhanced Electrocatalytic Activity of a Polypyrrole/Magnetite Hybrid Electrode toward the Reduction of Dissolved Dioxygen. *Journal of Physical Chemistry C*, 2010;114(45):19338-19344). Additional information can be obtained by contacting C. Visy, University of Szeged, Dept. of Physics Chemical & Materials Science, Rerrich Sq 1, H-6720 Szeged, Hungary. The publisher of the *Journal of Physical Chemistry C* can be contacted at: American Chemical Society, 1155 16th St., NW, Washington, DC 20036, USA. Keywords: City:Szeged, Country:Hungary, Chemicals, Electrochemical, Emerging Technologies, Energy, Fuel Cell, Nanocomposite, Nanoparticle, Nanotechnology, Oil & Gas, Physical Chemistry This article was prepared by Energy & Ecology editors from staff and other reports.

Solid State Chemistry

New solid state chemistry findings from University of Szeged described

2010 OCT 29 - (VerticalNews.com) -- According to recent research from Szeged, Hungary, "Redox transformation and related processes in conjugated polymers have been studied by both classical (electrochemical quartz crystal nanogravimetry, in situ optical electrochemistry and a. c. impedance technique) and modern, direct analytical methods. As a model, polypyrrole thin layers have been deposited on a double-band indium tin oxide-supporting electrode-for the first time in the literature." "The structure of the printed circuit made possible to monitor simultaneously the electrochemical, the optical, and the conductance changes during the processes, occurring in the self-same film. The film has been deposited under similar conditions on a quartz crystal-supported platinum electrode, as well, to follow the mass changes. The oxidation state of the layers has been gradually modified by multiple potential steps, and the abovementioned measurements have been completed by elementary analysis performed by energy dispersive X-ray (EDX) spectroscopy. From the correlation of the results, obtained by independent methods, the mixed anionic and cationic charge compensation has been evidenced. While during the first part of the oxidation (-0.6 V to 0.0 V) cations are removed from the layer, in the second part (0.0 V-0.8 V) the anion incorporation is dominant," wrote C. Janaky and colleagues, University of Szeged. The researchers concluded: "The results prove that EDX measurements can deliver direct semi-quantitative information on ion exchange processes accompanying the doping-undoping of conducting polymers." Janaky and colleagues published their study in the *Journal of Solid State Electrochemistry* (Application of classical and new, direct analytical methods for the elucidation of ion movements during the redox transformation of polypyrrole. *Journal of Solid State Electrochemistry*, 2010;14(11):1967-1973). For additional information, contact C. Visy, University of Szeged, Dept. of Physics Chemical & Materials Science, Aradi V Sq 1, H-6720 Szeged, Hungary. Publisher contact information for the *Journal of Solid State Electrochemistry* is: Springer, 233 Spring St., New York, NY 10013, USA. Keywords: City:Szeged, Country:Hungary, Chemicals, Chemistry, Electrochemical, Solid State Chemistry, Solid State Electrochemistry This article was prepared by Chemicals & Chemistry editors from staff and other reports.

Electrochemical Research

Recent studies from University of Szeged add new data to electrochemical research

2010 SEP 10 - (VerticalNews.com) -- "The redox transformation of poly(3,4-ethylenedioxythiophene) (PEDOT) and poly(3-octylthiophene) (POT) has been studied and compared by combining simultaneous in situ UV-Vis-NIR spectroelectrochemical and ac impedance techniques," scientists in Szeged, Hungary report.

"Simultaneous changes of the conductance and the rate of the absorbance increase/decrease of the optically different charge carriers in the selfsame film gave direct and unquestionable evidence for that in PEDOT synthesised in aqueous solution the mono-cationic, while in POT the di-cationic segments are primarily responsible for the development of the name-giving property of conducting polymers," wrote P.S. Toth and colleagues, University of Szeged. The researchers concluded: "This difference in the role of the charge carriers could be partially observed between PEDOTs prepared in aqueous and acetonitrile (AN) solutions." Toth and colleagues published their study in *Electrochemistry Communications* (Application of simultaneous monitoring of the in situ impedance and optical changes on the redox transformation of two polythiophenes: Direct evidence for their non-identical conductance-charge carrier correlation. *Electrochemistry Communications*, 2010;12(7):958-961). For more information, contact C. Visy, University of Szeged, Dept. of Physics Chemical & Materials Science, Szeged, Hungary. Publisher contact information for the journal *Electrochemistry Communications* is: Elsevier Science Inc., 360 Park Avenue South, New York, NY 10010-1710, USA. Keywords: City:Szeged, Country:Hungary, Chemicals, Chemistry, Electrochemical Research, Electrochemistry

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