Electrochemically synthesized conducting polymer based composite thin layer electrodes with photocatalytic and magnetic behaviour

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Different conducting polymer based composite thin layers can be synthesized electrochemically by polymerizing in the presence of metal and semiconducting oxide particles, or biologically active materials. These new composites may be used as specially modified electrodes unifying electric and other kind of attractive properties, which give perspectives for numerous applications.

In this work recently synthesized representatives will be presented focusing on the characteristics and possible application of different nanocomposites.

The composites are studied by different electrochemical methods, and characterized by UV-Vis, FTIR, Mössbauer and X-ray Photoelectron Spectroscopy. Their properties are studied also by various techniques used in material science (SEM+EDX, XRD, ICP-AAS).

The polypyrrole / iron oxalate electrode – prepared through a special electrochemical synthesis [1] in the presence of iron(II)-oxalate dispersion – incorporates an unusual mixed valence complex anion, formulated as $[Fe(II)Fe(III)(oxalate)_3]^-$. Its observed stable negative photocurrent opens opportunity for the realization of cathodic photo-electrocatalytic processes.

Magnetite nanoparticle containing polymer composites such as poly(thiophene-3-acetic-acid)/Fe_3O_4 are promising as new electrodes possessing magnetic behaviour, and might be applied in magneto-selective electrocatalysis.

References:

[1] C. Visy, G. Bencsik, Z. Németh, A. Vértes
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