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Redoxactivity of the polypyrrole films doped with aromatic anions

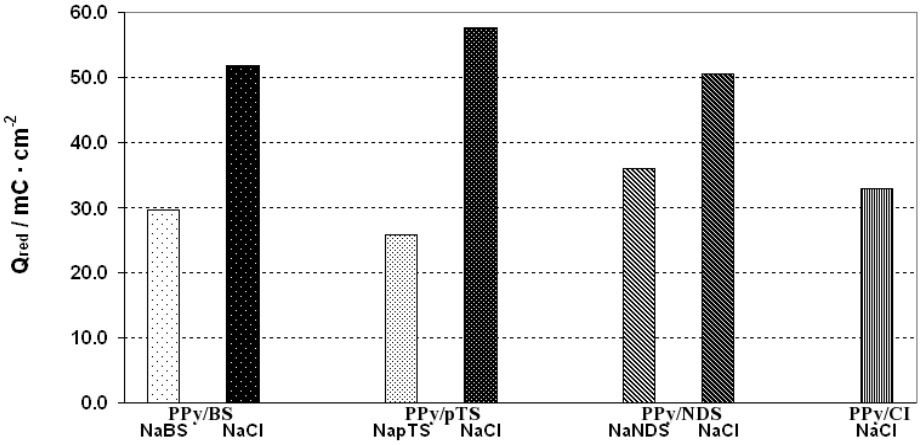
T.Raudsepp, M.Marandi, V.Sammelselg, T.Tamm[1] J.Tamm

Institute of Chemistry,[1]Institute of Technology, University of Tartu, Estonia,
terje.raudsepp@ut.ee

The nature of the supporting electrolyte used during electropolymerisation determines not only the type of the anions incorporated into the polymer to neutralize the positive charge of the oxidized form of the polymer chain but has a remarkable influence on the structure of the polymer. It is well known that the polypyrrole (PPy) films electrodeposited in the presence of aromatic anions such as toluenesulfonate have a good electrical conductivity but not so good redoxactivity [1-4].]. As resistivity of the conducting polymers is mainly determined by interchain hoping of electrons it is evident that good conductivity is related to the ability of the aromatic anions to stimulate the formation of a more regular structure of the polymer. It is very interesting to examine the redoxactivity of such kind of PPy films in other electrolytes. The main goal of this work was to investigate influence of redoping on Electrochemical Properties of the Polypyrrole Films and increase the redoxactivity of the PPy films deposited in the presence of aromatic sulfonates.

In this work electrochemical properties of the PPy films electrodeposited in the presence of middle sized organic anions benzenesulfonate (BS), p-toluenesulfonate (pTS) and naphtalene-1, 5-disulfonate (NDS) was investigated in the two types of electrolytes: a) containing the same anion as used in the electrodeposition solution and, b) in the solutions of small inorganic anions ($LiClO_4$, $NaNO_3$, NaCl). The morphology of the films surface was studied by AFM and the composition of the PPy films were determined by electron-probe microanalysis (EDS).

The voltammetric and EDS measurements show clearly that anion exchange between a PPy film and solution is relatively quick and is accelerated by cycling. It was established that the PPy films redoped with small anions have essentially large redoxactivity than original film. The increase of redoxactivity is illustrated in Fig.



The largest increase of redoxactivity was obtained in the case of the PPy films electrodeposited in solution of pTS and measured in solution of sodium chloride.

References

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