P-103 ELECTRODEPOSITION OF ULTRATHIN FILMS OF POLYANILINE–POLYSULFONIC ACIDS COMPLEXES AND THEIR BIOLOGICAL APPLICATIONS

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In the present work, ultrathin films of polyaniline (PANI) complexes were obtained by aniline electrodeposition from aqueous solutions of polysulfonic acids of different structures. PANI electrosynthesis was performed in potentiostatic regime, smooth gold plates being as substrate. The polyacids include flexible-chain ones such as poly-(2-acrylamido-2-methyl-1-propanesulfonic acid) (PAMPSA) and poly(styrene sulfonic acid) (PSSA) and semi-rigid-chain poly-4,4'-(2,2'-disulfoacid)-diphelylene-iso-phthalamide-co-4,4'-(2,2'-disulfoacid)-diphelylene-tere-phthalamide (co-PASA). The "common" PANI film obtained in the presence of HCl solution was used for comparison. The films were characterized by cyclic voltammetry, spectroelectrochemical, AFM measurement, and surface plasmon resonance spectroscopy.

The acceleration of aniline electropolymerization in the presence of polysulfonic acids in comparison to "common" PANI synthesis should be noted. The reason might be a high degree of aniline association with the polyacids. Moreover, changes in the shape of time dependences of charge and the rate of aniline polymerization according to polyacid used were observed.

It was shown earlier that chemically synthesized PANI and PANI-PAMPSA complex presented good sorbents for different biological objects such as viruses and non-viral proteins [1]. The integrated investigation by surface plasmon resonance spectroscopy and AFM showed all electrochemically synthesized PANI complexes to be good substrate for bioobject adsorption (namely, cDNA of influenza viruses and influenza viruses as themselves). Hydrophobic/hydrophilic properties are of the great importance for interaction of solid surfaces with proteins of bioobjects. Obtained complexes are characterized by different hydrophobicity: advancing water contact angles at the PANI and PANI-PAMPSA are 81 and 62° respectively. Using tensiometry of human serum albumine aqueous solutions and its contact angle measurements at the films surfaces the more effective interaction of PANI-PAMPSA (in comparison to "common" PANI) with protein molecules leading to significant alteration of its native conformation was found. Moreover, it was shown, that structure of PANI complexes influences the sorbent capacity of biological objects. Obtained results could open new perspectives in PANI polymer complex application in biology.

[1] Ivanova V. T., Ivanov V. F., Gribkova O. L., Kurochkina J. E., Matjushina R. O, Vannikov A. V., RU 2,372,951; 2009

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