An electrochemical study of interaction between contact nonequilibrium plasma and aqueous electrolytes system

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The use of contact nonequilibrium plasma and aqueous electrolytes system (low-temperature glow discharge electrolysis), when the cathode is in a liquid phase and the anode is at some distance from the liquid surface, makes it possible to carry out nonequilibrium oxidation processes in the liquid being treated. In the liquid media the oxidation processes occur which cannot be realized by using conventional electrolysis or by the action of arc-crown-, townsend- or barrier-discharge plasma on the liquid.

The fundamental aspects of low-temperature glow discharge electrolysis action on water and water solutions of different classes of inorganic and organic compounds were revealed. It was shown that the formation of liquid bipolar bifunctional electrode as a conductor of second kind is a basis of faraday processes. This fact presents a peculiarity of low-temperature glow discharge electrolysis and a difference from a classic electrolysis. The mechanism of these electrodes work is considered depending on a direction of polarizing current.

Variation in the pH of water solutions and the formation of hydrogen peroxides during contact electrolysis upon the low-pressure glow-discharge treatment of water were studied. Some physicochemical properties of the products of treatment in these water solutions were presented. The changes of physics-chemical properties of water solutions, features of electrochemical processes during the reduction of metals were investigated.

We have carried out studies on the use of low-temperature glow discharge electrolysis for the purification of industrial wastewater containing inorganic heavy metal salts, radioisotopes, and a wide range of organic compounds, including heavy biodegradable nonionic surfactants and microbiological contaminants.

High efficiency of the effect of low-temperature glow discharge electrolysis is shown for disinfection of bacterial muddied drinks and wastewaters. Possibility of low temperature glow discharge electrolysis application is considered on purpose to remove the artificial radionuclide and transuranium elements compounds.

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