

Nanostructured surfaces

Electrochemical reducing processes on nanostructured metal electrodes type “cluster-globule- surface”

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Nanostructured metal electrode of the type “cluster – globule - surface” was fabricated by ion-plasma deposition of nickel on the surface of the nickel plate. An area of the visible work electrode surfaces was $0.2375 \cdot 10^{-4} \text{ m}^2$. The samples obtained are metal platform of thickness 510^4 – 510^3 m , on the surface of which are located the cone-shaped metal elements (see Fig. 1).

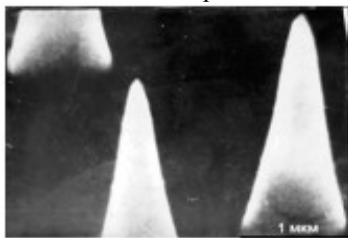


Fig.1. SEM images of individual elements of a nanostructured surface nickel electrodes. The area of the base of the cone is $3 \cdot 10^{11} \text{ m}^2$ and height of the top is 10^6 m . A surface concentration of elements in massive achieves 10^9 m^{-2} .

Using nanostructured nickel electrodes can lead to less costly production of electrolytic hydrogen [1], to provide selective determination of biologically active substances [2], and the electrochemical conversion of organic compounds. The process of dehalogenation of monochloroacetic acid on the structures of the tip of nickel occurs at much lower values of the electrode potential as compared with a smooth electrode and is accompanied by almost 10 - fold increase in current density. Increasing the rate of recovery on nanostructured electrodes is probably due to the energy characteristics of the current-producing processes on the tip structures of nickel.

1. *Shevchenko O.P., Aksimentyeva O.I., Lut O.A., Bilyi O.V.* Nanostructured electrode materials for electrochemical production of hydrogen. Patent (UA) U201104246 2011
2. *Shevchenko O., Lut O., Aksimentyeva O.* Highly sensitive sensor for detection of vitamin b1 on the nanostructural surface of nickel // Sensor Electronics and Microsystem Technologies.- 2011– T. 2 (8). – №1. – P. 69-73.