

The method of manufacturing a nanostructured gold film with controlled roughness refers to the fields of metallurgy, chemical technology, and electronics. The essence of the invention consists of immersing a gold film in a 10 % aqueous solution of sulfuric acid, where a previously installed carbon electrode was the anode, and the surface of the gold film became the cathode; passing an electric current; washing the film in distilled water after the current pulse and placing it in a fresh portion of distilled water for holding until the next processing cycle. During the passage of the pulse, the effect of the electric current was the accumulation of hydrogen in the layer of the gold film close to the surface.

The electrolysis current strength, the current pulse length in the electrochemical cell, and the time during which the film is washed in distilled water after the current pulse and placed in a fresh portion of distilled water to hold until further cycle processing is processing parameters that allow controlling the process of defects formation and, accordingly, surface roughness.

The technical result is creating the nanostructured gold film with a porous surface with the roughness determined by the pulse processing parameters. The best results were obtained with the current of 5 μA , the length of the electrolysis current pulse of 2 s, and subsequent washing after the current pulse of the film in distilled water and placing it in a fresh portion of distilled water to stand for 1 minute before the next treatment cycle. After 15 cycles of processing with such parameters, the porous layer with a roughness of 5-7 nm was created on the surface of the gold film.