Nanostructured surfaces
Formation of nanotitons in electric fields by spatially controlled chemical reactions

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Recent years, the volume research in area of the field ion and electron emitters for nanotechnology [1] is essentially increased. The high-field formation on the surface areas with high curvature is one of the most available directions. The report shows the results of development of the high-field production technology of nanoscale emission centers (nanotitons), which have been oriented along the axis of needle-shaped emitters. This technology is based on the phenomenon of low-temperature field evaporation, stimulated the active gas.

Figure. Schematic (a) and field ion (b) microscopy images of nanotiton

The studies were conducted in the working vacuum chamber of the field ion microscope, which allowed controlling the condition of the emitter surfaces. Nanotitons were made using the high-field treatment in a nitrogen atmosphere at a pressure about $3 \cdot 10^{-3}$ Pa. The applied voltage was corresponded to the electric field strength in the range (24 – 57) V/nm.

In this paper, it was carried out physical and computer experiments which showed the possibility of creating emitters in the shape of nanotitons by a method of spatially controlled chemical reactions in high electric fields. This method can be used to production of the ion and electron sources with the localized emission, microprobes - used in high-resolution emission microscopy, microelectronics and nanotechnology.

1. T. I. Mazilova and I. M. Mikhailovskij, Atomic mechanism of radiation-induced erosion of field electron emitters, Surface and Interface Analysis. Vol. 36, (2004) pp 510-514.