Brief information about the project

Name of the project	AP19576960 “Nanoselective structuring based on electron beam lithography for the creation of nanoplasmonics elements, protective elements and nanosensors”
Relevance	The modern development of nanostructuring methods has reached high perfection and is widely used in various fields of information technology, bio-diagnostics, nanoelectronics, optoelectronics, the creation of protective elements, etc. And further development of nanostructuring methods is aimed at improving the performance of technological processes and at finding new areas of application.In this regard, the present research is devoted to the development of a new, potentially more productive nanostructuring technology and its application to the manufacture of sensitive nanosensors. Research is also devoted to the use of electron beam lithography to create nanoplasmonic elements to increase the sensitivity of the SPR-imaging (Surface Plasmon Resonance) method and create protective elements to enhance the protection of coins, bars and products made of precious metals, giving them an aesthetic appearance.
Purpose	The goal of the project is to develop and optimize planar nanostructuring technology for; radical improvement in the sensitivity and resolution of SPR imaging and SPR genomics methods, development of a new planar technology of selective graft polymerization, creation of new holographic protective elements.
Objectives	1. Development of a method for creating nanostructured reliefs on the surface of noble metals based on the use of planar technologies of electron beam lithography and plasma etching. 2. Design and creation of nanoreliefs that implement new protective optical elements. 3. Study of the possibility of implementing a new technological approach based on nanoselective graft polymerization using various radiation sources and various substrate materials (quartz, silicon and polymer). 4. Study of spatial resolution and characterization of the performance of the new technological approach. 5. Study of the sensitivity of a nanostructured humidity sensor. 6. Development and creation of an installation for studying the absorption spectra of surface plasmons. Development and creation of a number of structures in the form of a 2D photonic (plasmonic) crystal. 7. Study and characterization of sensitivity improvement using a 2D photonic (plasmonic) crystal. 8. Development of the creation of a structure in the form of a two-level 2D photonic (plasmonic) crystal. 9. Study and characterization of the sensitivity enhancement of the 2D photonic (plasma) crystal method. 10. Preparation and publication of articles in peer-reviewed scientific journals in accordance with the requirements of the competition documentation.

Expected and achieved results	A method for creating nanostructured reliefs on the surface of noble metals based on the use of planar technologies of electron beam lithography and plasma etching will be developed. Nanoreliefs that implement new protective optical elements will be developed and created. The possibility will be explored and the optimal conditions for implementing a new technological approach based on nanoselective graft polymerization using various radiation sources and various substrate materials (quartz, silicon, and polymer) will be found. The spatial resolution will be investigated, and the performance of the new technological approach will be determined and characterized. The sensitivity of a nanostructured humidity sensor will be investigated. An installation for studying the absorption spectra of surface plasmons will be developed and created. Several structures in the form of a 2D photonic (plasmonic) crystal will be developed and created. Improvements in the sensitivity of SPR imaging using a 2D photonic (plasmonic) crystal will be studied and characterized. Structures in the form of a two-level 2D photonic (plasmonic) crystal will be developed and created. Improvements in the sensitivity of SPR imaging using a two-level D2 photonic (plasmonic) crystal will be studied and characterized. The results of the project will presumably be published.
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List of publications with links to them	-
Patents	patentable