Abstract Submitted
for the DPP17 Meeting of
The American Physical Society

Semiconductor nanostructures for plasma energetic systems ALEXANDER MUSTAFAEV[1], ROSTISLAV SMERDOV, BORIS KLIMENKOV, Saint Petersburg Mining University, Saint Petersburg, Russia — In this talk we discuss the research results of the three types of ultrasmall electrodes namely the nanoelectrode arrays based on composite nanostructured porous silicon (PS) layers, porous GaP and nanocrystals of ZnO. These semiconductor materials are of great interest to nano- and optoelectronic applications by virtue of their high specific surface area and extensive capability for surface functionalization. The use of semiconductor (GaN) cathodes in photon-enhanced thermionic emission systems has also proved to be effective although only a few (less than 1%) of the incident photons exceed the 3.3 eV GaN band gap. This significant drawback provided us with a solid foundation for our research in the field of nanostructured PS, and composite materials based on it exhibiting nearly optimal parameters in terms of the band gap (1.1 eV). The band gap modification for PS nanostructured layers is possible in the range of less than 1 eV and 3 eV due to the existence of quantum confinement effect and the remarkable possibilities of PS surface alteration thus providing us with a suitable material for both cathode and anode fabrication. The obtained results are applicable for solar concentration and thermionic energy conversion systems.

[1]Dr. Sci., Ph.D, Principal Scientist, Professor

Alexander Mustafaev
Saint Petersburg Mining University, Saint Petersburg, Russia

Date submitted: 15 Sep 2017 Electronic form version 1.4