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Novel semiconductor nanocomposites for plasma electronic systems ALEKSANDR MUSTAFAEV, ROSTISLAV SMERDOV, Saint Petersburg Mining University — The realisation of photon-enhanced thermionic emission (PETE) process for solar concentrators allows to integrate photovoltaic and thermionic effects in a single device thus facilitating a significant increase in the overall efficiency. The prototype PETE concentrator with semiconductor (GaN) electrodes is described. The quantity of incident photons with energies greater than the band gap of GaN (E_g = 3.3 eV) does not exceed 1 % of their total amount. Further research on porous silicon (PS) and PS-based nanocomposites for electrode synthesis is required, since a possibility to modify the E_g of such materials in a wide range from 1 to 3 eV exists due to the quantum confinement effect and considerable capabilities for surface functionalisation. The development of anodes for thermionic plasma energy systems requires the creation of unique materials characterised with low electron work function (ϕ_a). The use of a nickel-based anode coated with graphite/graphene layers intercalated by cesium atoms allowed to achieve a significant decrease in the electron work function (ϕ_a values amount to less than 1 eV), thus resulting in a threefold increase in energy conversion efficiency.[1]

[1]A.S. Mustafaev et al., **J. Appl. Phys.** 2018. 123. In print

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