"New "dry" plasma technology for nuclear materials processing"

Anna S. Petrovskaya[1], Alexander B. Tsyganov[1]
Sergey V. Surov[2], Andrey Yu. Kladkov[2], Daniil A. Blokhin[2], Pavel O. Gredasov[3]
1) Plasma application department, Spectrum-Micro LLC, St. Petersburg, Russia
2) Science and Innovation JSC, ROSATOM, Moscow, Russia
3) Leningrad Nuclear Power Plant, Rosenergoaton JSC,
Electric power division of ROSATOM, Sosnovy Bor, Russia

Task: The selective extraction of the radioactive isotope 14C from irradiated reactor graphite surface

Method: New thermo-plasma "dry" technology:

- deactivation treatment
- effective extraction of highly radioactive nano-micro-size layer
- compact collecting of the radionuclides via diffusion to anode
- avoid formation of the liquid secondary radioactive waste

Localization of the 14C isotope: In the experimental studies [1] was found that the 14C isotope is concentrated mainly on the graphite surface or deep under no more than 5mm.

Experimental realization and results: The direct current plasma discharge is ignited in argon at pressure of P ~ 0.1-1 bar, Voltage (500-1000) V, Current discharge (0.1-1) A/cm^2

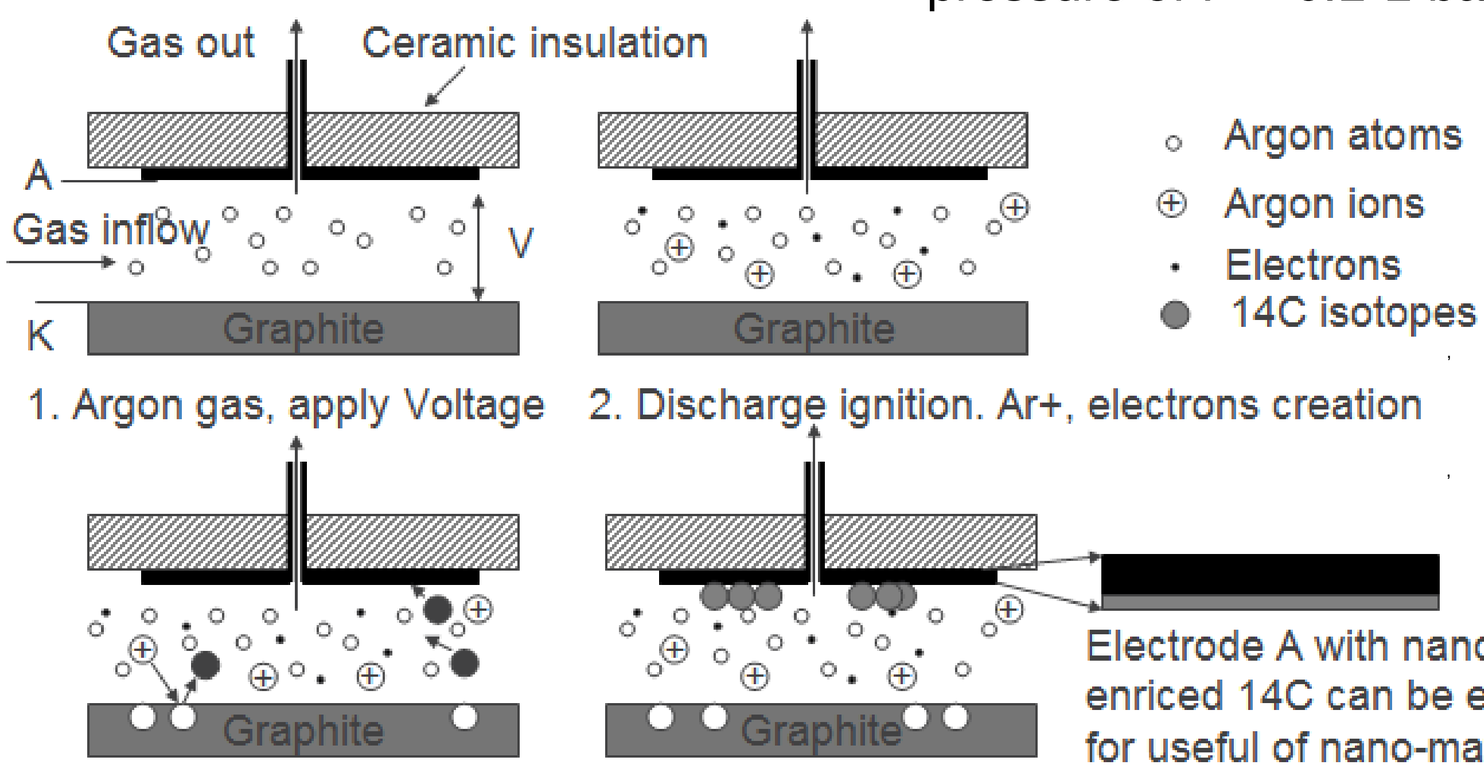
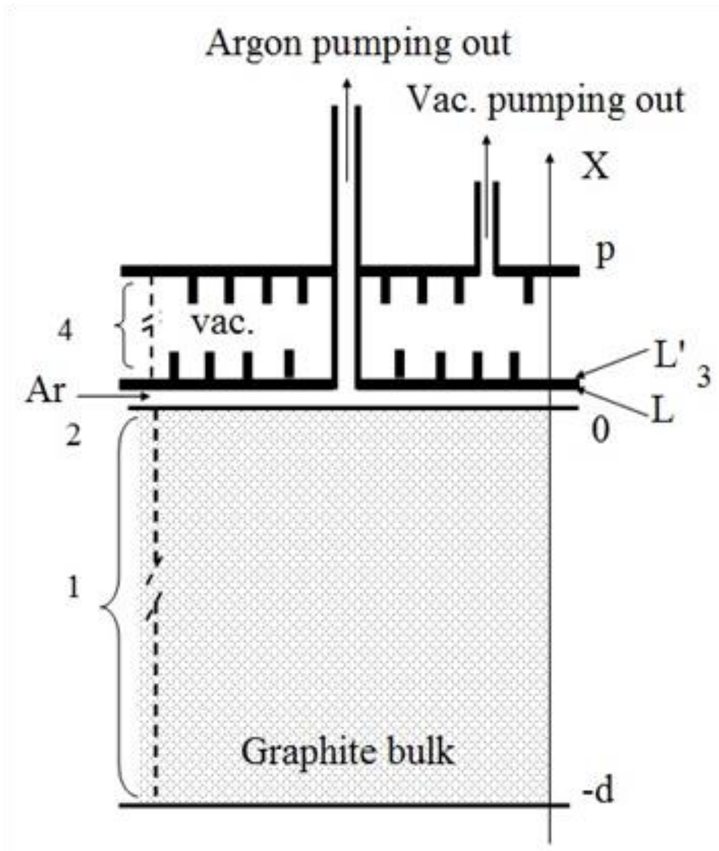
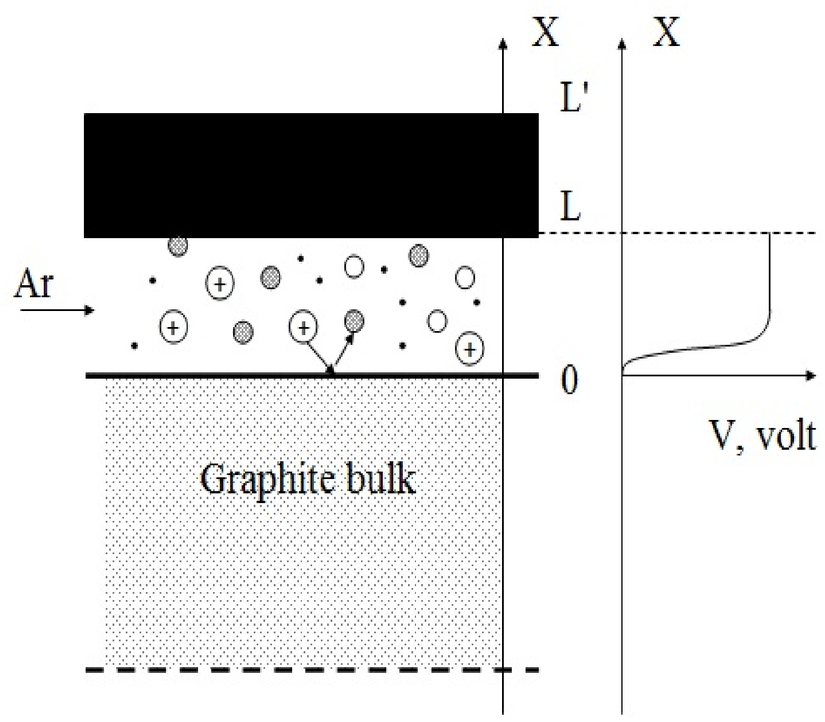


FIG.1. The plasma sputtering cell scheme demonstrates the process of ion sputtering of graphite surface.





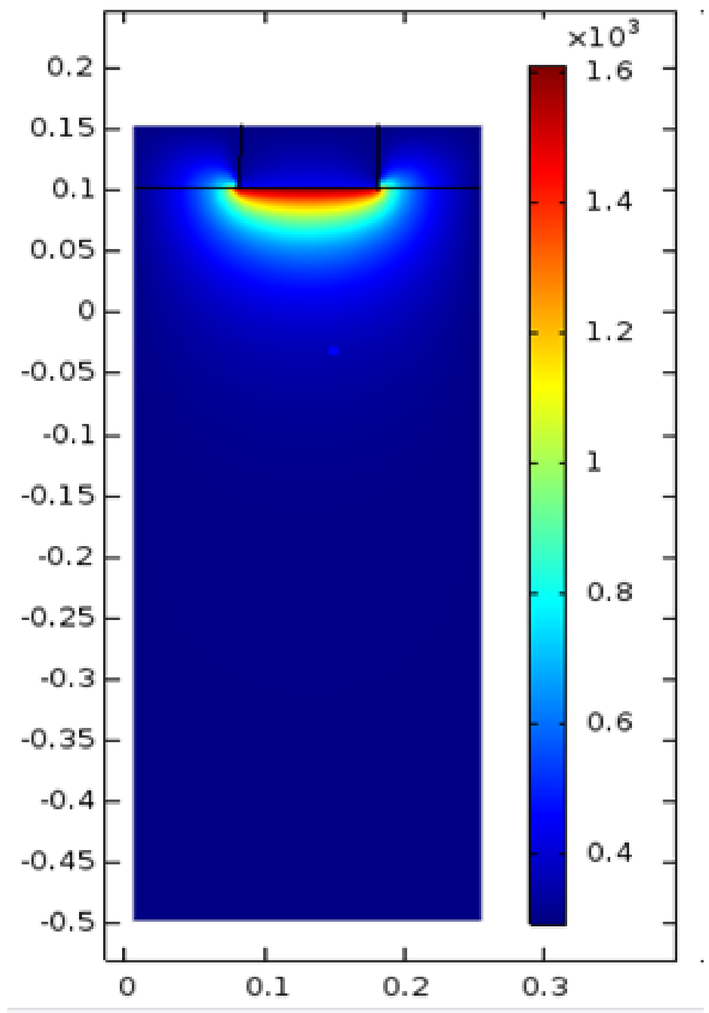


FIG.2a,b. The plasma sputtering cell scheme. The micro – plasma discharge gap and the distribution o

FIG.2.c shows the calculation result of the three-dimensional temperature distribution. The side faces of the g

Reference: [1] D. LaBrier, M.L. Dunzik-Gougar, Journal of Nuclear Materials, vol. 448, issue 1-3, pp. 113, 2014

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