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

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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/cm²

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 of ions.

FIG.2.c shows the calculation result of the three-dimensional temperature distribution. The side faces of the graphite block are cooled.