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FALCON Ion Source Focusing System Optimization for Effective Beam Impurities Mass-Separation OLEKSII GIRKA, STANISLAV HERASHCHENKO, IVAN BIZYUKOV, ALEKSANDER BIZYUKOV, KONSTANTIN SEREDA, V.N. Karazin Kharkiv National University — The numerical and experimental investigation of the intrinsic capability for impurities mass-separation of FALCON ion source [1-2] was carried out. Optimal distance between the ballistic focusing cathodes and the magnetic lens was obtained via numerical calculations to provide maximum ion flux impurities separation. New magnetic lens for FALCON ion source was designed and manufactured as a result of calculations. A set of experiments on high-flux ion beam impurities mass-separation was carried out. Cyclohexane was used as a working gas. Cyclohexane molecule dissociated at gas discharge. As a result, there were hydrogen H^+ ions and C_XH_Y group ions. Polished SS304 samples coated with TiN were irradiated. Irradiation experiments showed that impurities are mass-separated and form the circle of a radius from 0.6 to 1.3 cm. There is free of impurities hydrogen only ion beam into this circle. Optimized FALCON ion source with closed drift provides particle and heat fluxes per unit surface of the target which are by the order of magnitude higher in comparison with existing ion sources designed for the plasma-surface interaction study.

[1] O. Girka, I. Bizyukov, K. Sereda, A. Bizyukov, M. Gutkin, V. Sleptsov, Rev. Sci. Instr., 83, (2012) 083501;
[2] M. Gutkin, A. Bizyukov, V. Sleptsov, I. Bizyukov, and K. Sereda, U.S. Patent US 7622721 B2 (2009)

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