

Spectroscopic Measurement of a Barium Loss Rate from a Hollow Cathode Emitter Depending on its Temperature

Fedorova A.E.^{1,2,@}

¹ State Scientific Centre of the Russian Federation—Keldysh Research Center, Onezhskaya Street 8, Moscow, 125438, Russia

² Moscow Institute of Physics and Technology, Institutskiy Pereulok 9, Dolgoprudny, 141701, Russia

@ fedorova.ae@phystech.edu

Barium depletion in hollow cathodes is one of the key factors limiting their lifetime [1]. The optical emission spectroscopy methods were applied to evaluate a rate of barium loss from the emitter. A method of barium concentration assessment in the emitter's plasma based on the intensity of its spectral lines was proposed. The study involved monitoring of the intensity of the atomic barium line with a wavelength of 553.5 nm. The barium concentration in plasma and, consequently, its loss rate was estimated using the proposed method. The cathode was investigated in two modes: external heating and autonomous mode. It was revealed that external heating increases a barium loss rate by an order of magnitude. Thus, a number of heater activation cycles should be taken into account when predicting a cathode lifetime.

- [1] Doerner R, Tynan G R, Oyerzabal E *et al.* 2004 Plasma surface interaction studies for next-generation ion thrusters *40th AIAA/ASME/SAE/ASEE Joint Propulsion Conference and Exhibit* (Fort Lauderdale, FL, USA) pp 1–8