

Abstract Submitted  
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**Experimental studies of wall material effects on the Hall thruster discharge**<sup>1</sup> YEVGENY RAITSES, ARTEM SMIRNOV, NATHANIEL J. FISCH, Princeton Plasma Physics Laboratory — The effects of secondary electron emission (SEE) properties of the channel wall material on the electron temperature and the electron cross-field current are studied for a conventional annular geometry Hall thruster. The linear growth of the maximum electron temperature with the discharge voltage, observed in the channel with a low SEE yield, suggests that SEE is responsible for the electron temperature saturation in the thruster with the channel walls having a higher SEE yield. The temperature saturation is directly associated with a decrease of the Joule heating, rather than with the SEE-enhanced electron energy loss at the walls [Raitses et al., *Phys. Plasmas* **12**, 073507 (2005)]. The reduction of the Joule heating is due to the decrease of the electric field, which, in its turn, occurs because of a local increase of the electron cross-field mobility. These results may support the recently predicted kinetic regime of plasma-wall interaction with counter-streaming beams of secondary electrons from the opposite walls of the thruster channel [Sydorenko et al., *Phys. Plasmas* **13**, 014501 (2006), and I. Kaganovich, invited talk, this conference].

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