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Magnetic Field Tailored Annular Hall Thruster with Anode Layer
SEUNGHUN LEE, HOLAK KIM, JUNBUM KIM, YOUBONG LIM, WONHO CHOE, Korea Adv Inst of Sci Tech, KOREA INSTITUTE OF MATERIALS SCIENCE COLLABORATION — Plasma propulsion system is one of the key components for advanced missions of satellites as well as deep space exploration. A typical plasma propulsion system is Hall effect thruster that uses crossed electric and magnetic fields to ionize a propellant gas and to accelerate the ionized gas to generate momentum. In Hall thruster plasmas, magnetic field configuration is important due to the fact that electron confinement in the electromagnetic fields affects both plasma and ion beam characteristics as well as thruster performance parameters including thrust, specific impulse, power efficiency, and life time. In this work, development of an anode layer Hall thruster (TAL) with magnetic field tailoring has been attempted. The TAL is possible to keep discharge in 1 to 2 kilovolts of anode voltage, which is useful to obtain high specific impulse. The magnetic field tailoring is used to minimize undesirable heat dissipation and secondary electron emission from the wall surrounding the plasma. We will report 3 W and 200 W thrusters performances measured by a pendulum thrust stand according to the magnetic field configuration. Also, the measured result will be compared with the plasma diagnostics conducted by an angular Faraday probe, a retarding potential analyzer, and a ExB probe.

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