

SPACE PROPULSION SYMPOSIUM (C4)
Electric Propulsion (4)

Author: Mr. Jongsub Lee

Korea Advanced Institute of Science and Technology (KAIST), Korea, Republic of, jongsubi@gmail.com

Ms. Mihui Seo

Korea Advanced Institute of Science and Technology (KAIST), Korea, Republic of, smh0717@gmail.com

Prof. Jongho Seon

Satrec Initiative, Korea, Republic of, jhseon@khu.ac.kr

Mr. Seongmin Kang

Satrec Initiative, Korea, Republic of, smkang@satreci.com

Prof. Wonho Choe

Korea Advanced Institute of Science and Technology (KAIST), Korea, Republic of, wchoe@kaist.ac.kr

Mr. Younho Kim

Satrec Initiative, Korea, Republic of, yhk@satreci.com

VISUAL OBSERVATION OF HALL THRUSTER INTERNAL PLASMA AND PERFORMANCE
ENHANCEMENT THROUGH AN EFFICIENCY ANALYSIS**Abstract**

A low power Hall thruster is under development with the target specifications of 10 mN thrust, > 1500 s specific impulse at about 200 W anode input power, aimed at applications to 200 kg level small satellites. With a short annular part inside the discharge channel, electrons are not only confined in the azimuthal EB drift but also trapped by the axial magnetic mirror effect, which is especially a significant confinement mechanism in the cylindrical type Hall thruster. For better understanding of the electron confinement inside the discharge channel, internal plasma structures were observed through an outer discharge channel made of fused silica at different magnetic field configuration. At the same time, plasma parameters such as ion energy, plasma potential, and ion beam current were measured by using a retarding potential analyzer, a Faraday probe, and Langmuir probes mounted on a rotary stage. With the obtained data, the thrust efficiency which is expressed as the product of propellant, voltage, and current utilization was evaluated and analyzed based on the measured thrust. In order to find an optimized thruster configuration, experimental data were obtained in 150 V - 300 V anode voltage with different channel dimensions. So far, the thruster with the 40 mm diameter operated at 8 sccm Xenon gas flow achieved 10 mN thrust and >30