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Development of Upper Atmosphere Simulator for Air Breathing Ion Engine YASUYOSHI HISAMOTO, The Graduate University for Advanced Studies, KAZUTAKA NISHIYAMA, Institute of Space and Astronotical Science, Japan Aerospace Exploration Agency — There is an increasing need for super low Earth orbiting satellites to observe the terrestrial environment from an altitude of 150km to 250km. These satellites have to cancel the air drag to stay in such an orbit for several years. A completely new concept, the Air Breathing Ion Engine (ABIE), has been proposed for spacecraft drag compensation. The ABIE takes in and uses the low-density atmosphere surrounding the satellite as a propellant. A laboratory environment which imitates the orbital conditions on such a super low earth orbit is essential to study ABIE on ground. This project attempts to synthesize the environment in super low Earth orbit using a 6cm ECR plasma source. An atomic oxygen beam with 5eV was realized by reflecting plasma off a metallic surface. The atomic oxygen flux is measured by polyimide covering a QCM using polyimide erosion. There is a radial distribution of the atomic oxygen flux, and we think that reflecting plasma occurs at a cusp on one of the magnets providing the ECR magnetic field. We achieved a flux of 5E14 atom/cm2/sec, which corresponds to the orbital conditions at an altitude of 250km. The next step is retrofitting the laboratory equipment to use as an intake feed for the air breathing ion engine.

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