

## Ground-based atomic oxygen simulation for LEO satellites

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A spacecraft orbiting low Earth orbit encounters high-energy collisions against atomic oxygen which consisting upper atmosphere of the Earth. Even though pressure in orbit is quite low, typically  $10^{-4}$  Pa, a high-orbital velocity of spacecraft, a few km/s, results in collision density high-enough for changing surface properties of spacecraft materials; it is typically  $10^{15}$  atoms/cm<sup>2</sup>/s. The collision density, or flux, of  $10^{15}$  atoms/cm<sup>2</sup>/s corresponds to surface atomic density of solid surfaces, thus a surface atom experiences a collision in every second. When a reaction product has high vapor pressure, it vaporizes and surface function of the material is lost. In order to simulate reaction of atomic oxygen with materials in a ground-based facility, atomic oxygen must be accelerated to a velocity of 8 km/s. This is achieved by a high-energy pulsed laser. A laser-detonation atomic oxygen source is operational at the TSC of JAXA and Kobe University. In this presentation, we are reporting laser detonation atomic oxygen sources that is a world standard for atomic oxygen-related researches.