

## Development of Generic Plasma Irradiation System for Modeling of Space Weathering at Solar System Bodies

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Surface and atmosphere of solar system bodies are continuously irradiated with the planetary magnetospheric plasma, solar wind, solar photon, cosmic dusts, and ring grains, which are responsible for long-term alteration of surface and atmospheric materials on timescales up to geological scale (Giga years) known as the 'space weathering'. The space weathering accompanies creation and destruction of molecules in the surface and atmospheric materials (see e.g., Johnson et al., in Jupiter textbook, 2004). For example, organic compounds like tholins are likely created and destroyed via the space weathering at Titan's upper atmosphere and icy moon's surfaces at Jupiter and Saturn (e.g., Waite et al., 2007; Lopez-Puertas et al. 2013). This suggests that the newly created/destroyed molecules are accumulated on the surface over the geological time scale, which are likely essential energy and material sources for evolutions of the surface, atmosphere, and possibly interior. However, the creation and destruction balance of surface/atmospheric molecules on the geological timescale are still unknown because of small irradiation doses in the previous laboratory experiments. Here we develop a new laboratory experiment system for modeling of the space weathering on geological timescales. In order to associate the space weathering with evolution of body's magnetic field, we first try to model the plasma space weathering with a high-fluence charged particle irradiation ( $<10^{23}$  particles/cm<sup>2</sup>). Now fabrication of the plasma irradiation system is going on after structural and thermal designs. The current status of development will be presented in this poster.

Keywords: Space weathering, Plasma, Surface bounded exosphere bodies