

Performance report of solar wind ion irradiation equipment

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For understanding the evolution of the solar system, the material distribution in the early solar system is important. Meteorites provide large information on materials of the solar system, but they do not retain direct evidences for which parent body each meteorite came from.

The comparison between reflectance spectra of asteroids and meteorites suggest that the origins of almost all meteorites are asteroids. However, there are clear differences between reflectance spectra of asteroids and meteorites [references], which may be due to the space weathering on the surfaces of the asteroids. Recent studies proposed the importance of the influence of the solar wind implantation on the asteroidal surfaces in the near-Earth orbit [e.g. 1, 2]. Solar wind is composed of ~95% hydrogen, ~4% helium and other atoms [3]. However, space-weathering effects by low energy proton and helium ions consisting of the solar wind have not been understood well. In this study, we established ion beam irradiation equipment in ISAS/JAXA. This equipment is composed of an ion gun, main chamber (ion irradiation room), load lock chamber (sample preparation and FTIR measurement room), and FTIR. We can select ions with a specific mass and valence using the electric and magnetic fields. The maximum acceleration energy of ions is 5 keV. The reflection spectra of the irradiated samples can be measured without exposing the sample to the atmosphere. The optical path of FTIR can be purged with nitrogen. Therefore, the FTIR spectra of irradiated samples are obtained with minimized influences of adsorbed water and atmospheric fluctuations. In this presentation, we report the performance (e.g. beam current, beam shape) of ion beam irradiation equipment.

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キーワード：太陽風、宇宙風化

Keywords: solar wind, space weathering