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A 会場 ：11/6　AM2 （10:45-12:30）
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Triple-dome electrostatic sensor for simultaneous electron/ion measurements with hemispheric field-of-view by an angular deflector

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For these decades, numerous space exploration missions have been conducted or planned based on miniaturized satellite/spacecraft bus systems. Newly-developed satellite configurations symbolized by “micro-satellite” or “cubesat” are prevailingly applied also for innovative or state-of-the-art missions dedicated to in-situ space plasma measurements. As known well, the in-situ plasma measurements should involve several observational targets achieved by completely different measurement principles, which is apt to require substantial mission resources like dimension, weight, power, telemetry, and so on. In the case of the space plasma particle measurements, almost identical but independent electrostatic energy analyzers have been adopted as the most conventional plasma particle sensors, which means that the mission has to afford the fabrication and installation of at least two independent sensor heads separately for electrons and ions. While the common dimensions and weights of these space plasma particle sensors are not unrealistically large for the application to miniaturized satellites, it would get more plausible and fruitful to install a newly-designed plasma particle instrument on an exploration satellite if two sensor heads for electron and ion measurements could be unified into one sensor head. The characteristic energy range of the plasma particles in the terrestrial/planetary space environment is mainly from a few eV to several tens of keV, requiring several kV outputs at most from high-voltage power supply units in the sensor head. The unified sensor head for electrons and ions could share the high-voltage power supply units to reduce the instrumental resources. It is also crucial to obtain a wide field-of-view by the sensor unit to achieve accurate measurements for three-dimensional velocity distribution functions of the hot components in the space plasma. In addition to the current development for the first type of unified electron/ion sensors with a fully planar field-of-view, as reported in the past presentations by our group, we are also leading the development of the second type of unified sensor covering a hemispheric field-of-view by an “electrostatic angular deflector”. The most characterized feature of this sensor unit is the integrated angular defector commonly used for electrons and ions for expanding the conical field-of-view to a hemispheric range. After both electrons and ions pass through the angular deflector, an “electron/ion separator” divides the electron and ion trajectories into individual routes reaching the energy-discriminating section consisting “triple-dome” type of electrostatic analyzer. The triple-dome electrostatic analyzer could make the simultaneous energy analyses for the electrons and ions only by using a common high voltage applied to the middle dome. This high-voltage output is also applied to the electron/ion separator after a linear attenuation by a simple resistivity dividing circuit, contributing to the resource reduction. The engineering model of this sensor head has been fabricated and experimentally evaluated through the initial calibrations by using our electron/ion beamline facility. The design and calibration results are discussed in this presentation.