Progress report of development and ground calibration of DESTINY+ Dust Analyser

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DESTINY+ is a Solar System small body exploration mission led by JAXA to demonstrate multiple technologies for fast flyby exploration and conduct scientific observation of 3200 Phaethon and cosmic dust including ejecta particles from the body.
For dust science, DESTINY+ Dust Analyser (DDA) will detect hypervelocity impacts of interplanetary and interstellar dust particles during the interplanetary cruising phase, and hopefully Phaethon ejecta particles at the flyby phase. DDA is a time-of-flight mass spectrometer measuring ions generated by hypervelocity impact ionization of dust particles. The development of DDA is led by University of Stuttgart while the ground calibration activity is being conducted by an international collaboration among multiple researchers and institutions in Europe, US, and Japan.
This presentation reports the progress of development and ground calibration activity of DDA. As of early 2021, the development status of DDA has proceeded to critical design phase during which the engineering model of DDA will be developed according to the interface condition agreed with the spacecraft system. For the ground calibration, a new dust accelerator is expected to be available at University of Stuttgart. In addition, development of new calibration methods has been proceeded utilizing some ionization techniques used in e.g. SIMS, LA-ICP-MS, and MALDI as alternative ways to dust accelerator i.e. microparticle impact ionization. These alternative calibration methods are expected to expand the type or number of available sample materials and calibration frequency.

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