On-ground characterization of the Hayabusa2 near-infrared spectrometer (NIRS3)

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On-ground calibration tests of the near infrared spectrometer (NIRS3) for the Hayabusa-2 mission had been conducted toward the spacecraft launch at the end of 2014. We present the test results and the expected performance in the target asteroid observations. The primary objectives of NIRS3 are (1) to investigate aqueous and/or thermal alteration processes on asteroids, (2) to map the composition of the asteroid global surface, and (3) to characterize the effect of space weathering combining with the artificial impact experiment. In order to achieve those objectives, the NIRS3 was designed as a point spectrometer based on the fundamental design concept of the Hayabusa's near-infrared spectrometer (NIRS). The designs of optical system, detector and cooling system, however, completely differ from those of NIRS because the spectral range was changed to the 3-microns region for detecting water/hydroxyl absorption bands. The optical system consists of Si-Ge lenses and grating. An InAs linear image sensor is used instead of NIRS's InGaAs sensor. The entire spectrometer unit is controlled with low temperature using passive cooling radiator to reduce dark current and internal thermal radiation. As a result of the calibration tests, we confirmed almost similar optical efficiency, spectral resolution and detector responsibility as the design values, and found a non-linear property of detector response due to zero-bias driving. We plan to determine the final instrument characteristics toward the asteroid observations combining with in-flight calibration observations.