

**Mission Concept Study for the 2020 US Astrophysics Decadal Survey:
The Latest Study Status of the Mid-infrared Spectrometer and Camera (MISC)
for the Origins Space Telescope (OST)**

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The Origins Space Telescope (OST; Meixner et al. 2018; Leisawitz et al. 2018) is one of the four mission concepts studied for the 2020 US astrophysics decadal survey. The OST has two mission concepts; Mission concept 1 is composed of a cryogenically cooled 9.1 m off-axis telescope and five instruments covering wavelengths from 5 to 660 μ m, while Mission Concept 2 of a cryogenically cooled 5.9 m on-axis telescope with JWST-sized collecting area and four instruments covering wavelengths from 5 to 660 μ m. The Mid-infrared Spectrometer and Camera (MISC; Sakon et al. 2018) is one of the instruments studied both for the Origins Space Telescope (OST) Mission Concept 1 and 2 (cf., OSS, Bradford et al. 2018; FIP, Staguhn et al. 2018; HERO, Wiedner et al. 2018). The mid-infrared transit spectrometer (TRA) is the primary function of the MISC instrument and is base-lined for the Concept 2 study. The MISC TRA employs the densified pupil spectroscopic design (Matsuo et al. 2016) to achieve <5 ppm of spectro-photometric stability and covers 2.8-20 μ m with R=50-300. The highest ever spectro-photometric stability achieved by MISC TRA enables to detect bio-signatures (e.g., ozone, water, and methane) in habitable worlds in both primary and secondary transits of exoplanets and makes the OST a powerful tool to bring a revolutionary progress in exoplanet sciences. The mid-infrared wide-field imaging and low-resolution spectroscopic function of the MISC instrument, which provides the OST not just with a focal plane guiding function but also with a powerful tool to diagnose the physical and chemical condition of the ISM using dust features, molecules lines and atomic and ionic lines, is also presented to the Decadal Review as an up-scoped version of the MISC instrument. In this presentation, I will give a summary of the latest study status of the MISC instrument for the OST.

References

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