## Axetris EMIRS200 black body IR Source built into MERTIS thermal infrared spectrometer

# Infrared Source aboard BepiColombo to explore Mercury

**The BepiColombo Mission is a joint project between the European Space Agency (ESA) and Japan Aerospace Exploration Agency (JAXA). Axetris Infrared Sources are being used in the MIR spectrometer MERTIS that is on board the Mercury orbiter and was developed by German Aerospace Center (DLR) and University of Muenster.**

### The BepiColombo Mission

Mercury is the smallest and least explored planet in our solar system. Studying Mercury's surface in order to understand its formation history is a major goal of the mission. The **Me**rcury **R**adiometer and **T**hermal **I**nfrared **S**pectrometer **(MERTIS)** will be instrumental in mapping surface mineralogy, analyzing surface composition, and studying thermal effects on Mercury's surface.

### Studying Spectra in the 7 – 14 µm Range

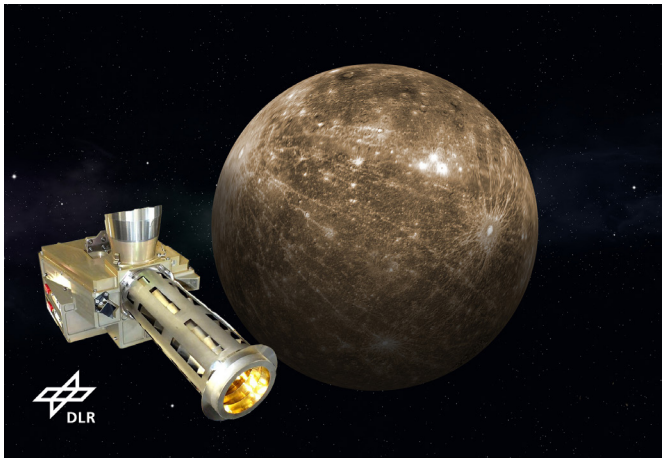
The IR spectrometer will operate in the 7-14 µm wavelength range for detecting elemental signatures of minerals such as feldspars, elemental sulfur, and other rock-forming minerals abundant on Mercury. The spectrometer is based on sequential emission measurements. A stable emission from a reference blackbody source (held at 700K / 427°C) is a prerequisite to attain the required spectral resolution.

### Axetris MEMS-based Infrared Sources as black body emitters

The electrically modulated Infrared Sources (EMIRS200) from Axetris were chosen due to their black body emission characteristics. Long lifetime and emission stability are key strengths of the MEMS-based design.

The unique design of EMIRS200 and EMIRS50 is based on a resistive heating element integrated onto a thin dielectric membrane which is suspended on a micro-machined silicon structure. The products are available in several package types from classical transistor outline TO's to ceramic surface mount devices including reflectors and broadband window options.

*MERTIS developer team:*
*DLR Institute of Optical Sensor Systems: https://www.dlr.de/os/desktopdefault.aspx/tabid-6956/*




*Axetris Infrared Sources are part of the MERTIS Infrared Spectrometer on board the BepiColombo Mercury Mission*

### Key Facts BepiColombo Mission / MERTIS

- Launched on October 10th, 2018
- Approximate 7 years flight time to Mercury
- Launch Mass 4100 kg
- Temperatures endured up to 350°C
- Operational Lifetime > 1 year after reaching final orbit
- Mercury Planetary Orbiter (MPO) will carry 11 instruments, one of which is MERTIS

*DLR Institute of Planetary Research: https://www.dlr.de/pf/desktopdefault.aspx/tabid-178/327_read-37536/*
*University of Muenster: https://www.uni-muenster.de/Planetology/ifp/research/geologischeplanetologie/MERTIS.htm*
*Astro- und Feinwerktechnik Adlershof GmbH: http://www.astrofein.com/astro-und-feinwerktechnik-adlershof/home/*

*Detailed information about the project and MERTIS can be found on ESA's website: http://www.cosmos.esa.int/web/bepicolombo/mertis*
*Interactive journey: https://www.cosmos.esa.int/web/bepicolombo*
*Launch: https://www.esa.int/Our_Activities/Space_Science*

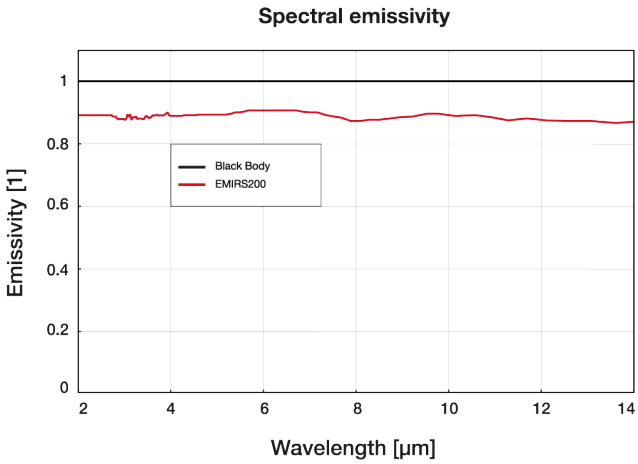
## Axetris Infrared Sources for Gas Detection and Monitoring

Besides use in spectroscopic applications, Axetris IR Sources are ideally suited for compact IR gas detection modules using measurement techniques such as non-dispersive infrared spectroscopy (NDIR), photoacoustic infrared spectroscopy (PAS) and attenuated-total-reflectance FTIR spectroscopy (ATR).

## Key Benefits

- True black body radiation (2 to 14 µm)
- High electrical input to optical output efficiency
- Low power consumption
- High emissivity
- Fast electrical modulation
- Long lifetime and stability

## Emission Spectrum vs. Wavelength



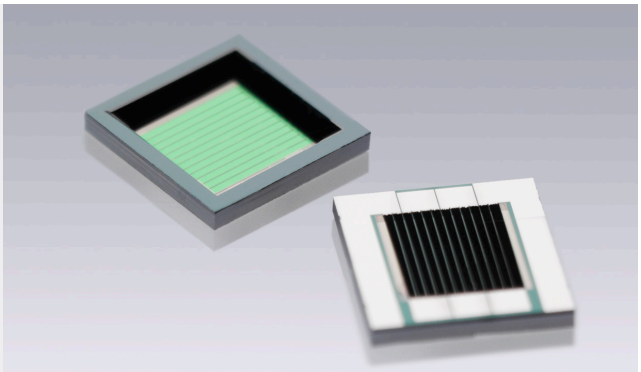

*Axetris Infrared Sources' emission profiles closely resemble that of a black body, and typical emissivity values of 0.85 are achieved by the unique design*

## Credits

Axetris thanks the following development partners of MERTIS for their kind permission to reproduce the information in this document: Institut für Planetologie, Westfälische Wilhelms-Universität Münster, Astro- und Feinwerktechnik Adlershof GmbH (Berlin), Deutsches Zentrum für Luft- und Raumfahrt (DLR e.V., Berlin-OS/PF)

## About Axetris Infrared Sources

Axetris Infrared Sources are micro-machined, electrically modulated thermal infrared emitters. The unique design is based on a resistive heating element integrated onto a thin dielectric membrane, which is suspended on a micro-machined silicon structure.
Infrared Sources from Axetris are used in a number of gas detection applications in medical, industrial, environmental and automotive industries.



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