Ferrari, S., Maturilli, A., Carli, C., Helbert, J., D'Amore, M., Nestola, F., Zorzi, F., Hiesinger, H.

TIR Spectroscopy: Looking for Igneous Rocks on the Surface of Mercury.

Recent MErcury Surface, Space ENvironment, GEochemistry, and Ranging (MESSENGER) findings, corroborated by petrologic modeling, reviewed the surface composition of Mercury as mainly constituted by low-Fe and Mg-rich basalts. This interpretation dismisses the previously assessed widespread presence of more felsic materials - as on the Moon's surface - leaving open the question of the crust petrogenesis of Mercury. Assessing the presence of a differentiated crust on the surface of Mercury is among the intrinsic objectives of the next ESA/JAXA BepiColombo mission to Mercury. The ESA Mercury Planetary Orbiter will carry the Mercury Radiometer and Thermal Imaging Spectrometer (MERTIS, 7-14 μm), which will map the surface mineralogical composition of the planet. The interpretation of spectra collected along a wide range of daily surface temperatures is complicated by the relocation of the band minima depending on the temperature (e.g., Helbert et al. 2013). In addition, the simultaneous presence of different minerals, each one with its characteristic thermal expansion coefficient, results in a more difficult interpretation of the spectra. In this work we examine the spectral variations of linear mixtures of plagioclase and pyroxenes that most likely could be present in the differentiated igneous crust of Mercury, in addition to the *T*-dependent spectral variations of the single constituents. Furthermore we show how two different thermal expansion coefficients combined in the same sample reveal in a thermal infrared spectrum. To this aim we measure high-*T* emissivity - up to 725K - of natural binary compositions (e.g., anorthosite, gabbro, norite) and their single-phase components, whose chemistries are provided by microprobe analyses. Besides spectroscopy, all the provided samples are analyzed before and after the heat-treatment using X-Ray Diffraction, in order to verify any possible variation due to the annealing.

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