

Mid-IR reflectance of silicate glasses as a possible analog for Mercury: influence of granulometry



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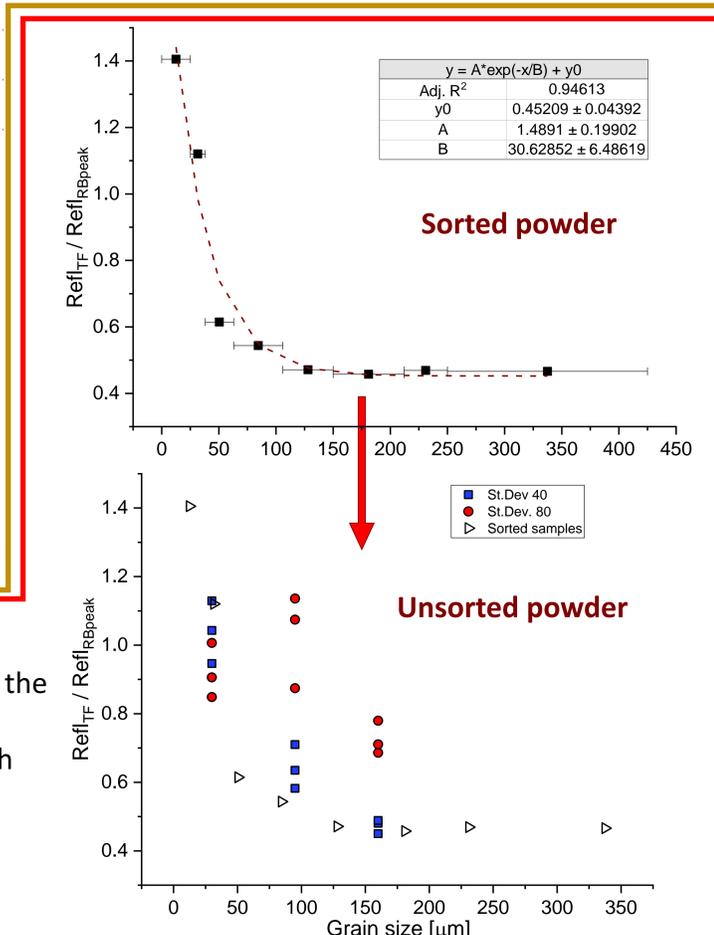
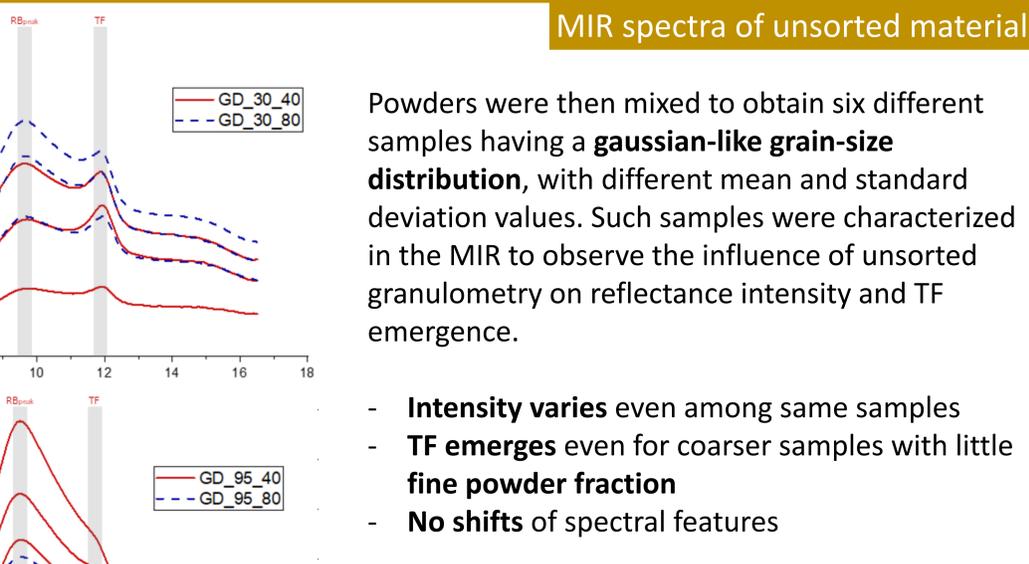
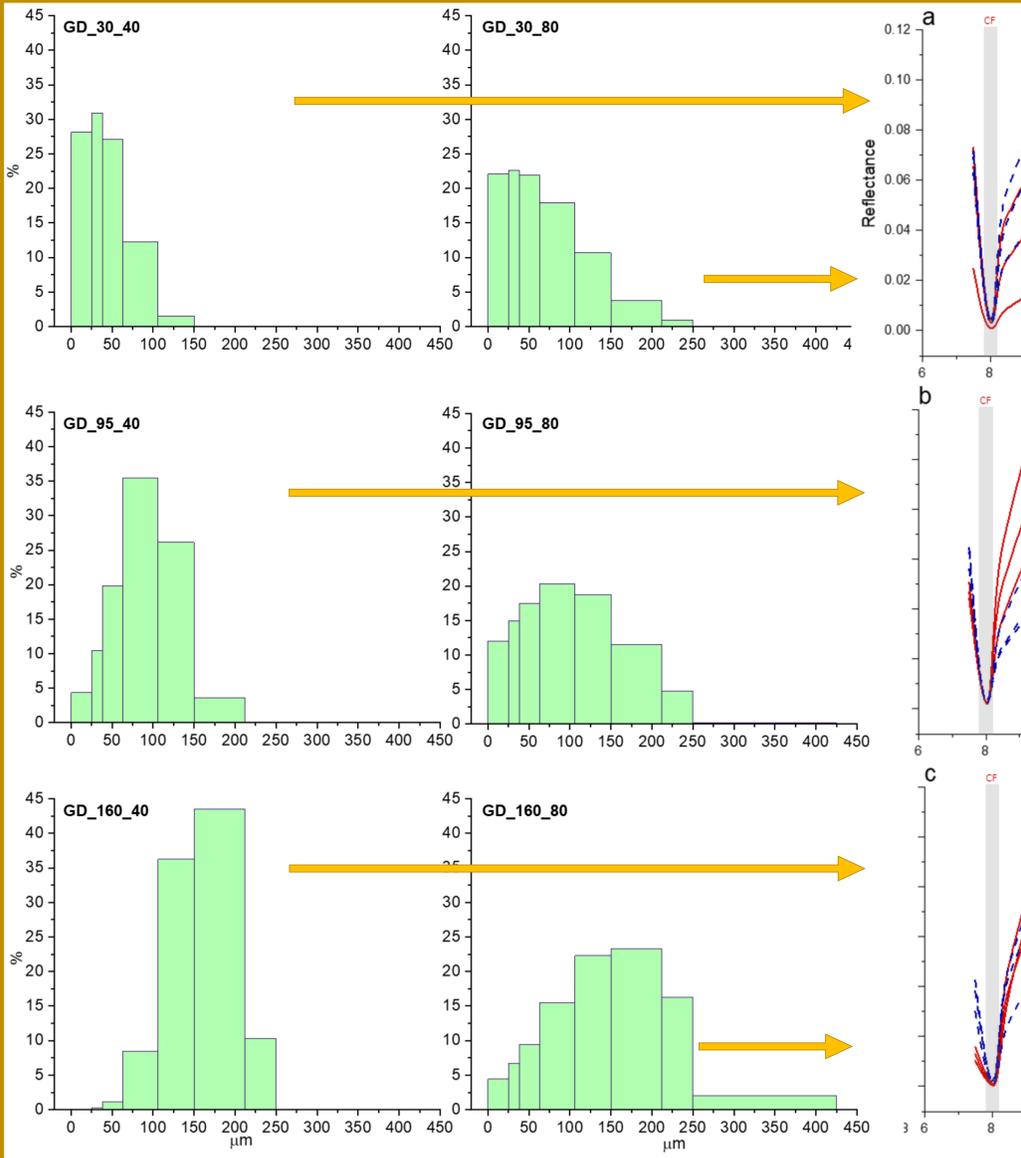
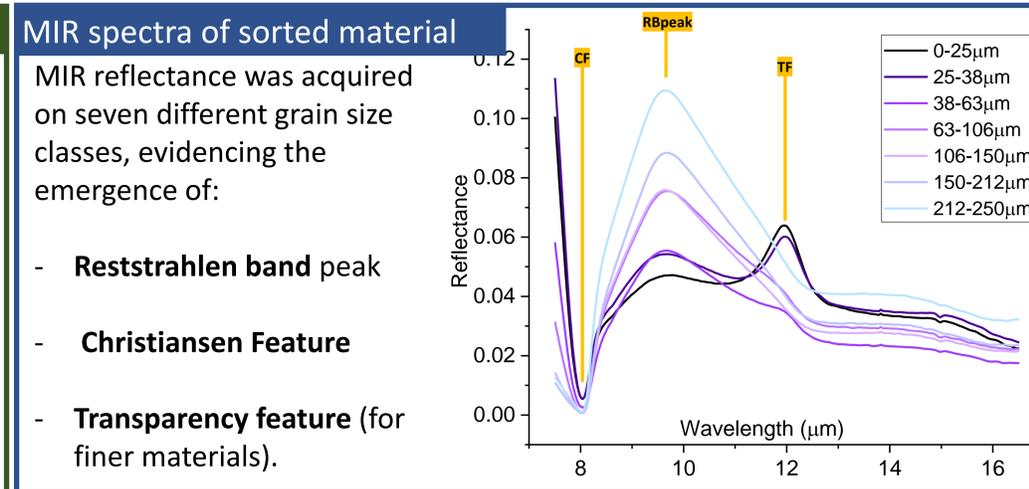
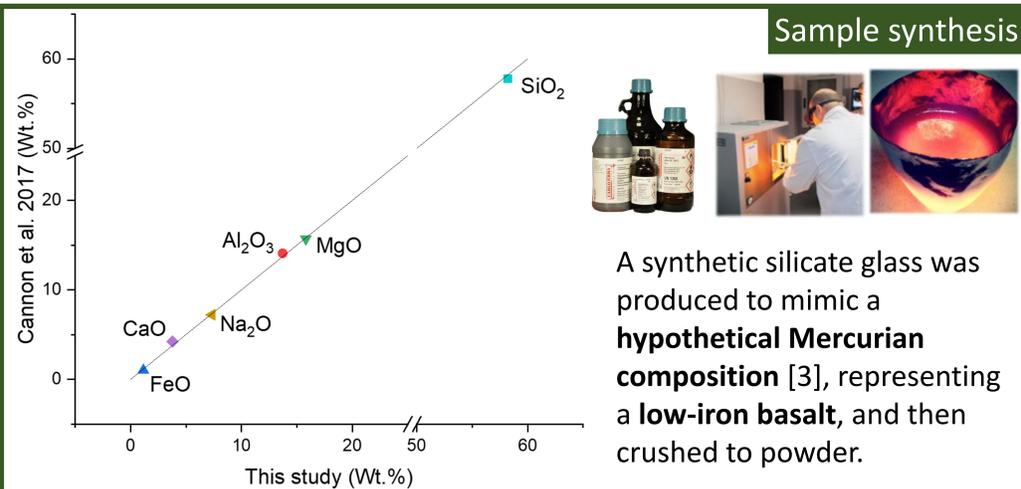
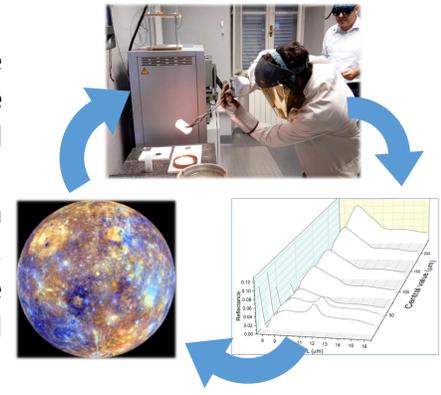
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Rationale

Volcanic products are widely present on Mercury both as lava flows and possible volcanoclastic material, and silicate glasses represent a major component in such products. Using experimental petrology, we have reproduced a **Mercury-like silicate glass**, from which we have obtained powdered samples having different granulometric characteristics and **obtained Mid-Infrared (MIR) reflectance data**.

We offer reference data with qualitative observations and quantitative parameterization of spectral characteristics, and in particular, we observe how a small fraction of fine material can greatly influence spectral response of coarser powders. Results of this work will be pivotal for the **interpretation of data collected by BepiColombo mission** but need to be integrated with other possible Mercurian compositions. All spectra produced in this study are described in [1] and published open source in ASI's SSDC infrastructure [2] <https://www.ssdc.asi.it/>



Possible parameterization

We have observed that a possible parameterization of such products is possible by calculating a ratio of the intensity of the spectra at TF and RB_{peak}. In this way, we have found **an exponential law that roughly describes how this value collapses for sorted powders**. However, such a model is not able to distinguish the mean values of unsorted powders, especially when St.Dev. of their distribution is larger. Thus, we might say that a small fraction of fine material might influence the spectral properties of a generally coarser powder, and this could lead to a non-accurate interpretation, and a general underestimation of the grain size of Mercurian terrain.

REFERENCES: [1] Pisello et al. (2023) Mid-Infrared (MIR) Spectroscopy of Silicate Glasses as Analogs for Mercury's Surface: The Influence of Grain Size. *Minerals.*; 13(2):170. [2] Zinzi et al. (2018). The SSDC contribution to the improvement of knowledge by means of 3D data projections of minor bodies. *Advances in Space Research*, 62(8), 2306-2316. [3] Cannon et al. (2017). Spectral properties of Martian and other planetary glasses and their detection in remotely sensed data. *Journal of Geophysical Research: Planets*, 122(1), 249-268.