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T-dependent far infrared to millimeter wave opacity measurements of interstellar dust analogs

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We produce glasses with pyroxene- ($\text{Mg}_x\text{Fe}_{1-x}\text{SiO}_3$) and olivine ($(\text{Mg}_x\text{Fe}_{1-x})_2\text{SiO}_4$) like stoichiometry and various Mg/ Fe-ratios as analog materials for siliceous interstellar dust. We conduct measurements in the wavelength range between $50\mu\text{m}$ and 4mm and at temperatures between 10K and 300K . For this purpose, we use a FTIR spectrometer equipped with a bolometric detector and a continuous flow LHe cryostat and a custom-made microwave spectrometer (coop. I. phys. Inst., Univ. of Cologne, [1]) equipped with a closed cycle LHe cryostat.

Besides the known temperature dependence of the absorption of amorphous silicates (e.g. [2], [3]), we also found a strong dependence on the iron content of our samples, as well as on the oxidation state of the incorporated iron. Neither the governing processes for the temperature dependence of the absorption, nor for the strong influence of iron are described so far.

[1] Potapov, A. et al. (2014) Rev. Sci. Instrum. 85, 073102.

[2] Boudet, N. et al. (2005) ApJ 633, 272-281.

[3] Coupeaud, A. et al. (2011) A&A 535, A124.

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