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# Low temperature MIR to submillimeter mass absorption coefficient of interstellar dust analogues

## I. Mg-rich glassy silicates★ (Corrigendum)

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We would like to draw attention to the fact that the mass absorption coefficients (MACs) presented in the paper “Low temperature MIR to submillimeter mass absorption coefficient of interstellar dust analogues. I. Mg-rich glassy silicates” published in A&A 600, A123 (2017) are the MACs of the grains in the polyethylene matrix and not in vacuum. Indeed, Eq. (4) in Demyk et al. (2017) gives the MAC for the isolated grains in the matrix. The additional step to correct for the effect of the matrix, which is detailed in Mennella et al. (1998), was not done in Demyk et al. (2017). Therefore, in order to compare the experimental MACs presented in Demyk et al. (2017) with those calculated from optical constants available in databases or in cosmic dust models, it is necessary to perform the calculations in the same medium used to acquire the experimental data. This has not been done in Demyk et al. (2017) where Sect. 5.1, Figs. 5 and 8, and Table 1 compare MACs that are not comparable: the MACs for grains in polyethylene (PE) for the measurements and the MACs for grains in vacuum for the cosmic dust models. We provide here new versions of Table 1 and Figs. 5 and 8 of Demyk et al. (2017) in which the MAC for the silicates from astronomical models were calculated in an ambient medium of refractive index  $n = 1.51$  similar to the one of the pellets (polyethylene). Table 1 and Figs. 1 and 2 of the corrigendum replace Table 1, Fig. 5, and Fig. 8 of Demyk et al. (2017), respectively.

The main conclusions of the comparison of the experimental data with cosmic dust models have not changed: the measured MACs of the X40, X50A, and X50B samples are higher than the MACs of cosmic dust models and their spectral shapes are

very different from the  $\lambda^{-2}$  asymptotic behaviour adopted in cosmic dust models. However, the amplitude of the differences are reduced (see Table 1 and Fig. 1). The X40 sample, the most absorbent, is 2–2.4 times more absorbent at 100  $\mu\text{m}$  than the models and about 5 to 9 times at longer wavelengths. The two X50 samples are 1.3–2.7 times more absorbent than the models over the entire spectral range. For the X35 samples the MAC is 1.5–2.3 times more absorbent in the 100–300  $\mu\text{m}$  range and becomes as absorbent or even less absorbent at longer wavelengths. At  $\lambda = 100 \mu\text{m}$ , the MAC averaged over the four samples with different compositions,  $\langle \text{MAC1} \rangle$ , is twice as large as the MAC from the dust model calculated for a collection of spherical grains with a size distribution centred at 1  $\mu\text{m}$  and 2.4 times larger at  $\lambda = 1 \text{ mm}$  for 10 K grains (Table 1 and Fig. 2). At 10 K,  $\langle \text{MAC1} \rangle$  is 1.7 and 2 times larger than the MAC calculated for a continuous distribution of ellipsoid (CDE) at 100  $\mu\text{m}$  and 1 mm, respectively. At 10 K,  $\langle \text{MAC2} \rangle$ , the MAC averaged over the three samples with different compositions, X35, X50A, and X50B, is higher than the modelled MACs by a factor of  $\sim 1.7$  at 100 and 250  $\mu\text{m}$ , 1.3 at 500  $\mu\text{m}$ , and by a factor of  $\sim 1$  at 1 mm. The decrease in the MAC value with the temperature has to be considered in models based on MIR-to-FIR experimental MACs since using MACs measured at room-temperature instead of 10 K induces errors of a factor of 1.3–7 on the MAC (see Table 1) and thus on the calculated dust mass, depending on the sample and wavelength.

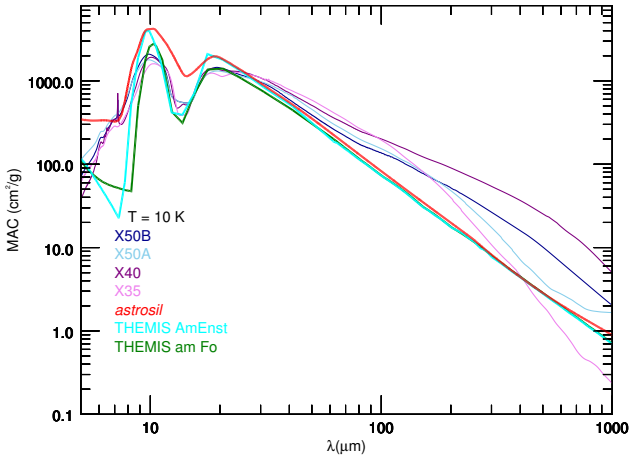
This also affects the comparison with previous experimental data if they are corrected for the effect of the matrix. Mennella et al. (1998) indicated that the matrix-correction factor is of the order of 1.3 for amorphous fayalite. Therefore, the MAC presented in Demyk et al. (2017) should be divided by a similar factor to be compared with experimental data from Mennella et al. (1998), Boudet et al. (2005), and Agladze et al. (1996). However, for a more reliable comparison, we advise the use of

\* Data from this article are publicly available through the STOPCODA (SpecTrosCopy and Optical Properties of Cosmic Dust Analogues) database of the SSHADE infrastructure of solid spectroscopy (<https://doi.org/10.26302/SSHADE/STOPCODA>). The dataset is accessible via the following link: [https://www.sshade.eu/data/experiment/EXPERIMENT\\_KD\\_20170711](https://www.sshade.eu/data/experiment/EXPERIMENT_KD_20170711)

**Table 1.** Value of the MAC in the polyethylene matrix for the glassy samples X35, X40, X50A, and X50B compared with that for the silicate component of cosmic dust models in polyethylene.

	Mass absorption coefficient in polyethylene ( $\text{cm}^2 \text{g}^{-1}$ )									
	100 $\mu\text{m}$		250 $\mu\text{m}$		500 $\mu\text{m}$		850 $\mu\text{m}$		1 mm	
	10 K	300 K	10 K	300 K	10 K	300 K	10 K	300 K	10 K	300 K
X35	194.6	217.2	19.2	30.1	2.0	5.2	0.4	1.8	0.2	1.4
X40	200.9	216.9	68.6	74.7	25.4	31.3	7.9	14.0	5.0	11.2
X50A	153.4	160.2	27.9	36.5	3.9	8.1	1.7	3.5	1.7	3.1
X50B	136.8	152.2	36.5	39.9	10.2	12.8	2.9	4.8	2.0	3.5
$\langle \text{MAC1} \rangle^{(1)}$	171.4	186.4	38.1	45.3	10.4	14.3	3.2	6.03	2.2	4.8
$\langle \text{MAC2} \rangle^{(2)}$	169.8	186.7	25.7	34.1	4.5	7.8	1.3	3.0	1.0	2.3
MAC sphere 0.1 $\mu\text{m}$ $^{(3)}$		82		12.6		2.8		1.15		0.9
MAC distrib spherical grains $^{(3)}$		84.2		12.6		2.8		1.15		0.9
MAC CDE $^{(3)}$		99.6		15.5		3.5		1.4		1.1

**Notes.**  $^{(1)}$  $\langle \text{MAC1} \rangle$  represents the MAC averaged over the four samples X35, X40, X50, and X50B.  $^{(2)}$  $\langle \text{MAC2} \rangle$  represents the MAC averaged over the sample X35 and the mean of the X50 and X50B samples.  $^{(3)}$ These MAC were calculated in an ambient medium of refractive index  $n = 1.51$  (corresponding to PE) and using the optical constants of the *astrosil* from Li & Draine (2001).

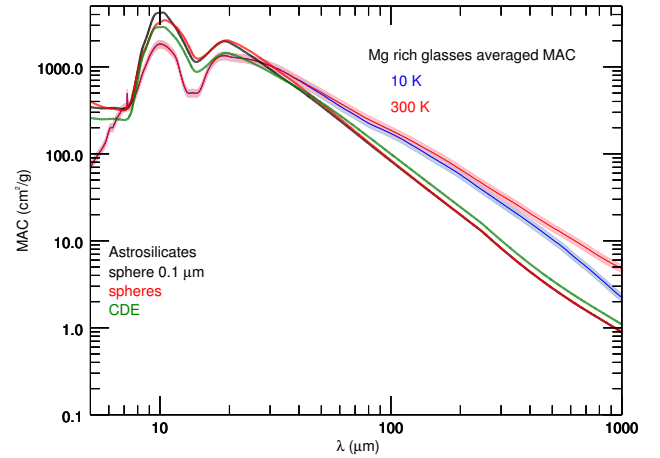


**Fig. 1.** Comparison of the measured MAC of the samples X50A, X50B, X40, and X35 at 10 K with the MACs calculated for cosmic dust models using Mie theory for spherical grains of 0.1  $\mu\text{m}$  in size: *astrosil* from (Li & Draine 2001) (red curve) and the two silicates from the THEMIS dust model (Jones et al. 2013): amorphous enstatite (cyan curve) and amorphous forsterite (green curve). We note that to be comparable with the experimental data, the MACs were modelled in PE and not in vacuum.

the optical constants derived from these MACs by Demyk et al. (2022) to simulate the MAC of the grains in a vacuum.

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**Fig. 2.** Comparison of averaged experimental MAC with the MACs calculated from cosmic dust model. The solid line curves with the uncertainty represent the MAC averaged on the four samples X35, X40, X50A, and X50B: (red) MAC at 300 K, (blue) MAC at 10 K. The MAC for the *astrosil* from (Li & Draine 2001) was calculated using Mie theory for a 0.1  $\mu\text{m}$  size grain (black), for a log-normal grain size distribution with a mean diameter of 1  $\mu\text{m}$  for spherical grains (red), and for a CDE model (green). We note that to be comparable with the experimental data, the MACs were not modelled in vacuum but in PE.

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