The Astrophysical Journal, 633:534, 2005 November 1

ERRATUM: "THE ABSENCE OF CRYSTALLINE SILICATES IN THE DIFFUSE INTERSTELLAR MEDIUM" (ApJ, 609, 826 [2004])

F. Kemper, W. J. Vriend, and A. G. G. M. Tielens

The optical properties of the crystalline silicate species diopside, forsterite, ortho-enstatite and clino-enstatite, measured by C. Koike et al. (Proc. 32nd ISAS LPS, 175 [1999]; A&A, 363, 1115 [2000]) were not given in mass absorption coefficients κ, as we incorrectly stated, but rather were presented as Q/a. Thus, the label on the vertical axis in Figure 6 should read Q/a (cm^{-1}).

Our analysis of the 10 μm profile will still give the same spectral fits, but they translate differently into the relative mass taken by the crystalline silicate species with respect to the amorphous silicates. Using specific densities ρ_d of 2.80 g cm^{-3} for diopside and ortho-enstatite, and 3.33 g cm^{-3} for forsterite, we recalculate the dust masses, and present the results in Table 2 below, which should replace Table 2 of the original paper. Figure 4 changes accordingly; although the curves stay the same, the labels in the four panels should read 0%, 1.1%, 2.75%, and 5.5%.

The determination of the upper limit to the SiC abundance is not affected by this error.

For the degree of crystallinity in the diffuse ISM, we find that the best fit to the data is achieved with a value of 1.1%. Although this is a factor of 5 higher than what we previously calculated, it is still well below the 5% derived previously (A. Li & B. T. Draine, ApJ, 550, L213 [2001]). The firm upper limit to the degree of crystallinity in the diffuse ISM is now 2.2%.

The increase in the upper limit for the fraction of crystalline silicates in the ISM will decrease the required amorphization timescale. Specifically, we find that for a degree of crystallinity of 1.1%, the amorphization rate in the diffuse ISM should be 2.5×10^{-8} yr^{-1}, corresponding to a timescale $\tau\sim4\times10^{7}$ yr. A conservative upper limit to the amorphization rate can be determined from the upper limit of 2.2% to the degree of crystallinity in the ISM. An amorphization rate of 1.2×10^{-8} yr^{-1}, or a timescale of $\tau\sim9\times10^{7}$ yr, is still consistent with the profile of the observed 10 μm feature. Over this timescale, a grain will have seen 3.5×10^{12} Ar^{2+} ions cm^{-2}, still not sufficient to explain the observed amorphization. On the other hand, the longer timescale (by a factor of 10 over previous, erroneous result) makes amorphization by Fe^{2+} more likely.

TABLE 2
Improvements of the Spectral Fit Achieved by Adding New Dust Components

Initial Dust Component (1)	Added Dust Component (2)	$\Delta\chi^2$ (3)	χ^2_ν (4)	F_χ (5)	Olivine (%) (6)	Pyroxene (%) (7)	Forsterite (%) (8)	Diopside (%) (9)	Clino-enstatite (%) (10)	Ortho-enstatite (%) (11)
Amorphous	...	...	69.9	...	84.9	15.1	...	...	...	...
Amorphous	Forsterite	40007	44.5	900	82.0	17.0	1.0	...	...	...
Amorphous	Diopside	11024	62.9	175	83.8	15.3	...	0.9	...	...
Amorphous	Clino-enstat.	<0	...	<0	...	...	...	...	...	...
Amorphous	Ortho-enstat.	552	69.6	7.9	84.6	15.1	...	...	...	0.3
Amorphous+forsterite	Diopside	139	44.4	3.1	81.9	17.0	1.0	0.1	...	...