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Chemical and petrographical characterization of amorphous silicate material in GEMS.

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Amorphous silicates can be found in GEMS (glass with embedded metal and sulfides) in chondritic porous interplanetary dust particles (CP IDPs) from cometary parent bodies and are either of interstellar origin or are late stage non-equilibrium solar nebula condensates [1]. We have characterized these amorphous silicates petrographically and chemically using TEM high resolution imaging and energy-dispersive X-ray analysis (EDX) on two microtomed particles. The amorphous silicates of the GEMS in particles L2099-A7 and L2083-E51 both show lower Mg/Si, Ca/Si, Al/Si, Fe/Si, Ni/Si and S/Si ratios compared with the solar value and previous bulk GEMS analyses. This non-solar chemical composition could favor a non-equilibrium condensation origin, but secondary processes on the cometary parent body could have modified chemical composition. Furthermore, their composition is not compatible with the chemical composition of interstellar dust [2]. More particles are planned to be investigated.

[1] Keller, L.P. and Messenger, S. (2011) GCA 75, 5336-5365. [2] Kimura et al. (2003) ApJ 582, 846-858.

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