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Analytical laboratory studies of solar system dust

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Contemporary solar system dust is collected as interplanetary dust particles (IDPs) and micrometeorites (MMs) in the stratosphere using aircraft, and at polar and mid-latitude ground locations using several sampling methods. The collections are fundamentally important to cosmochemistry, planetary science and early solar system accretional processes in particular because some IDPs and MMs are from parent bodies, including comets and other small, icy bodies, that are not well represented among known meteorite groups [1]. Small bodies are more likely to contain well-preserved solids from the outer solar nebula and presolar environments. The miniscule masses of individual IDPs and MMs have severely limited analytical measurements but advances in instrumentation are expanding the scope of measurements and providing fundamental insight. It is well established that IDPs and MMs contain the highest abundances of presolar refractory constituents (e.g. crystalline oxides and silicates) and recent studies have identified a population of non-refractory "soft"constituents [2]. All IDPs and MMs are pulse heated, many to incandescence, for several seconds during atmospheric entry followed by exposure to terrestrial contamination. A key finding and challenge arising from the study of "soft"constituents are that well-preserved IDPs and MMs appear to be much rarer than has previously been assumed.

REFERENCES:
1. S. Taylor et al. (2016). Elements, 12(3).
2. H. A. Ishii, et al (2018), Proc. Natl. Acad. Sci., in press.

Consider for a poster?

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