# Preparing micrometeorites for cosmogenic $^{26}$Al and $^{10}$Be measurement - identification without significant mass loss

J. Feige[a], A. Airo[a], D. Berger[b], M.J. Genge[c], J. Nissen[b], C. Sager[a] and M.D. Suttle[c]

[a]Department of Astronomy and Astrophysics, Technical University Berlin, Germany, [b]Center for Electron Microscopy (ZELMI), Technical University Berlin, Germany, [c]Department of Earth Science and Engineering, Imperial College London, UK

Each year, roughly 30,000 tons of extraterrestrial solid material, liberated from larger parent bodies within our Solar System, is captured by the Earth [1]. A significant fraction of this material are submillimetre-sized spherical to teardrop-shaped particles, termed micrometeorites. They represent signatures of asteroidal collisions and cometary sublimation [2], hence, the determination of their origin gives valuable information on recent cosmic events and processes. Their cosmic ray exposure age can be derived by measuring cosmic ray-induced spallation products such as the long-lived radionuclides $^{26}$Al and $^{10}$Be that accumulate within the particles during their journey through space (e.g. [3]).
The low concentrations of $^{26}$Al and $^{10}$Be within micrometeorites are close to the detection limits of current accelerator mass spectrometry (AMS), hence, any loss of material for their identification and classification as micrometeorites needs to be minimized. Surface composition analyses with EDX-measurements can lead to misidentifications, since these particles have melted during entry, and do not represent the total composition. For identifying micrometeorites with high confidence, it is necessary to analyze the interior of the particle [4], commonly through epoxy embedded cross-section EDX-analysis, which, however, leads to substantial material loss [5].
We present a new methodology on how to identify micrometeorites without a substantial material loss, nor impediments such as coating and epoxy embedding. Using a focused ion beam (FIB) on the non-coated particle, we are able to cut off a thin slice of the surface. Subsequently, with field emission electron probe microanalysis (FE-EPMA), its inner composition (and textures) can be determined quantitatively at lower detection limits down to a few tens of ppm with wavelength dispersive X-Ray spectrometers. Here, we show first results on 50-150 μm diameter micrometeorites collected from Antarctic moraine sediments originating from the Larkman Nunataks aeolian traps [6].

## References

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