SHOCK EFFECTS RECORDED BY ITOKAWA SAMPLES.

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We have been analyzing Itokawa samples in order definitively establish the degree of shock experienced by the regolith of asteroid Itokawa, and to devise a bridge between shock determinations by standard light optical petrography, crystal structures as determined by electron and X-ray diffraction techniques [1, 2].

We are making measurements of astromaterial crystal structures and using these to elucidate critical regolith processes. We use electron back-scattered diffraction (EBSD) and synchrotron X-ray diffraction (SXRD). We are comparing the Itokawa samples to L and LL chondrite meteorites chosen to span the shock scale experienced by Itokawa, specifically Chainpur (LL3.4, Shock Stage 1), Semarkona (LL3.00, S2), Kilabo (LL6, S3), and NWA100 (L6, S4).

Our research work will improve our understanding of how small, primitive solar system bodies formed and evolved, and improve understanding of the processes that determine the history and future of habitability of environments on other solar system bodies. The results will directly enrich the ongoing asteroid and comet exploration missions by NASA and JAXA, and broaden our understanding of the origin and evolution of small bodies in the early solar system, and elucidate the nature of asteroid and comet regolith.

References: [1] Zolensky et al. (2012) *Lunar and Planetary Science*, XLIII, #1477, Lunar Planet. Inst., Houston (CD-ROM); [2] Zolensky et al. (2014) *Hayabusa 2014: 2nd Symposium of Solar System Materials. Abstracts*.