

Electrical properties of Itokawa grains returned by Hayabusa

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A wealth of data exists on the properties of lunar regolith samples returned by Apollo missions e.g. [1,2] as well as on terrestrial minerals. However such experimental data have not yet been collected on asteroids material. In this study we present measurements of secondary electron emission characteristics from areas of samples RA-QD02-0126-02 and RA-QD02-0136-14 returned by Hayabusa [3] under electronic irradiation in the range 200eV to 5keV. Secondary emission yields are found to be strongly dependent on surface composition and roughness and orientation of Itokawa particles. We compare them to reference measurements including grains and powders of reference materials such as terrestrial Frosterie and JSC-1 planetary analog. In addition we observe the build-up of local electric field patterns arising from surface electrostatic charging in relation with grains morphology. Consequences on our understanding of regolith properties and electrostatic effects on planetary regolith will be discussed.

References:

[1] B. Feuerbacher et al , *Proceedings of the Third Lunar Science Conference*, 1972: Vol. 3, pp. 2655-2663

[2] D.W. Strangway et al, *Earth and Planetary Science Letters*, 1972, Volume 16, Issue 2, pages 275-281,

[3] Nakamura et al. , 2014, *Meteorit Planet Sci*, 49: 215–227. 10.1111/maps.12247

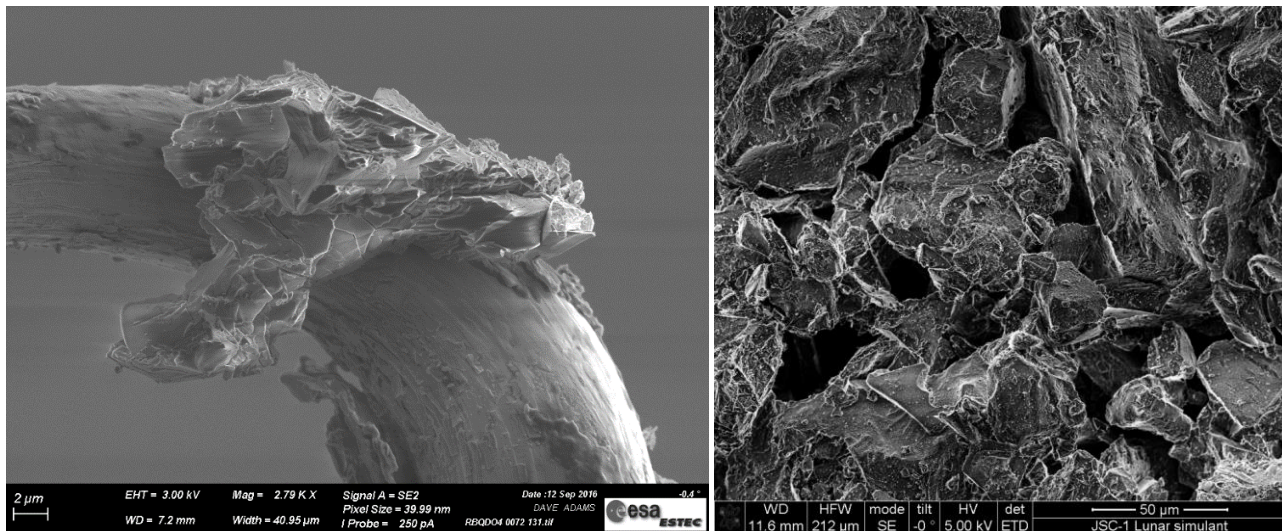


Figure 1: Left panel : Hayabusa sample RB-QD04-0072 observed at 3keV in Zeiss Sigma SEM. Right panel : mapping of a JSC-1 analog layer in FE-SEM Quanta 650.