

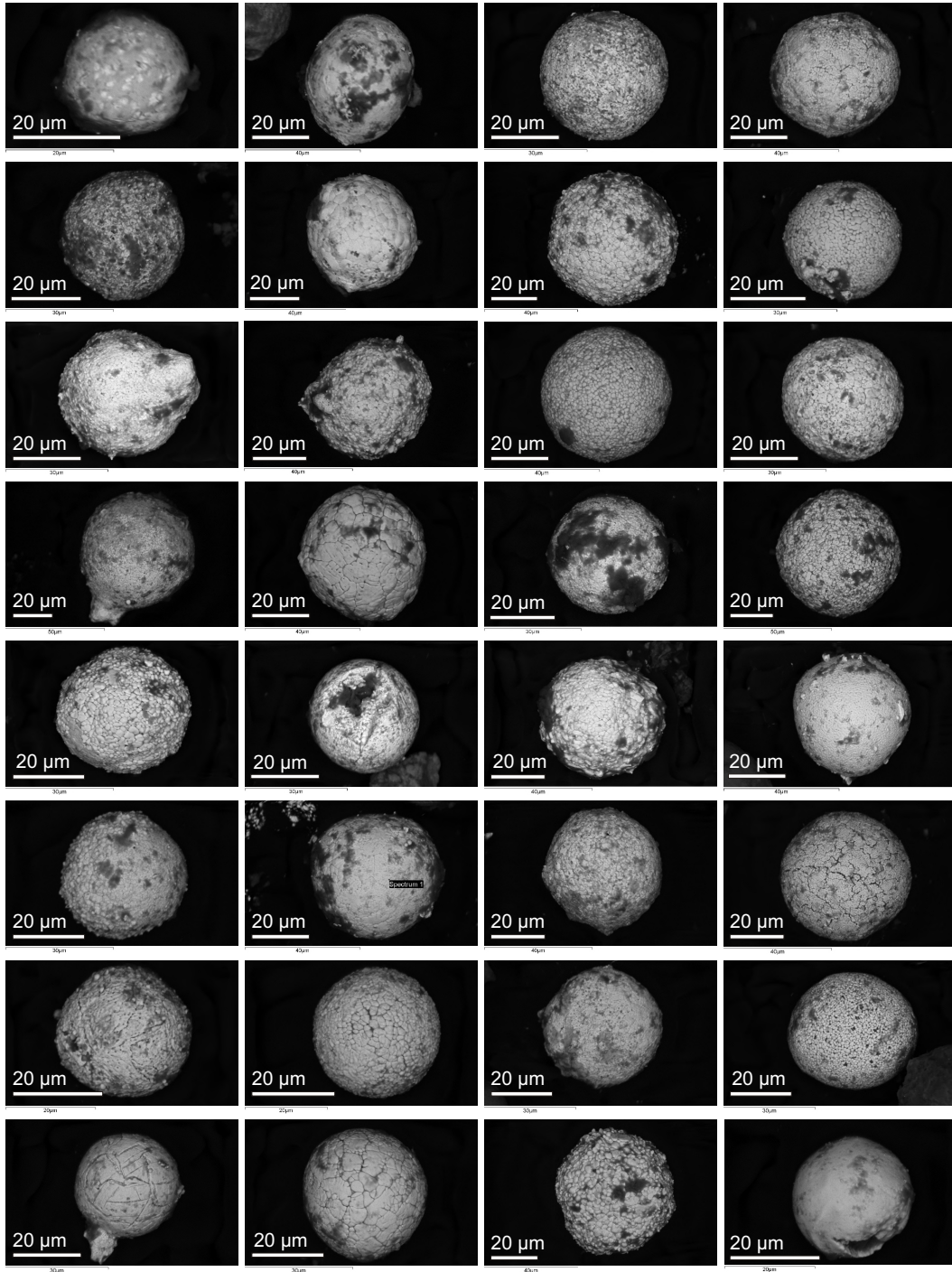
Lloyd *et al.* 2009. The morphologies and compositions of depleted uranium particles from an environmental case-study.

## Appendix 2

### Supplementary SEM images

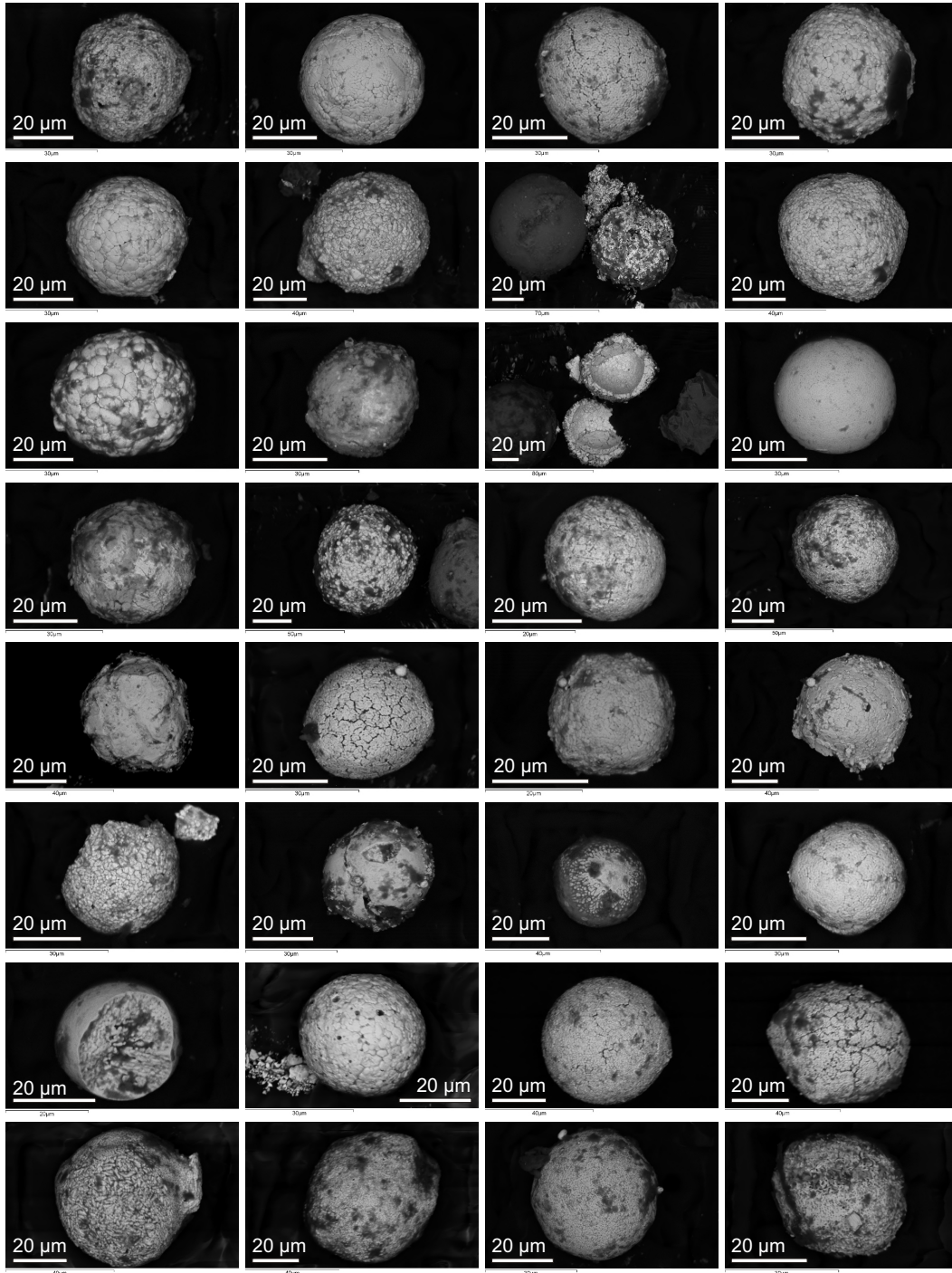
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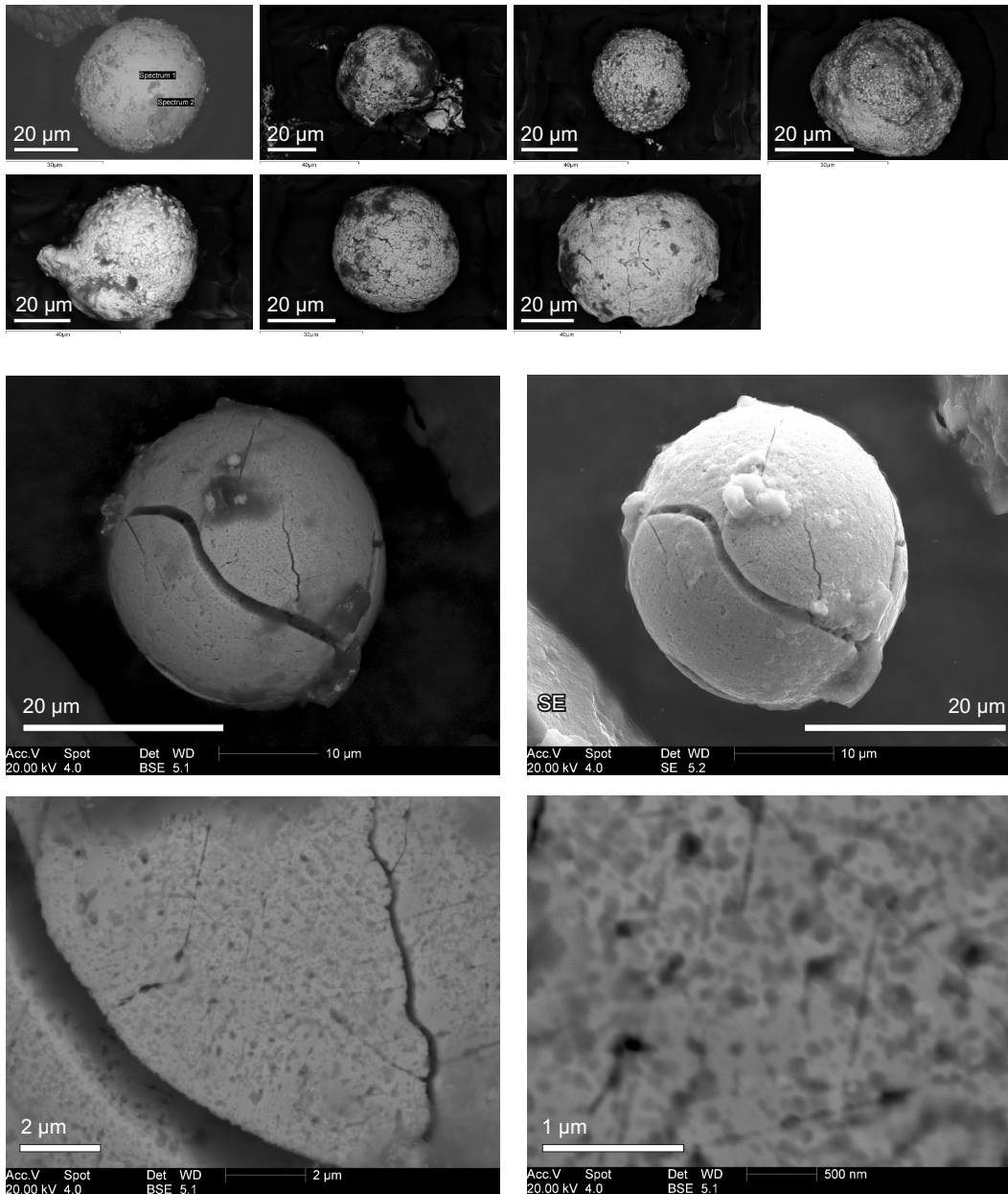
Appendix 2.1: Uranium oxide spheres collected from dust samples (dry environment). BSE mode SEM micrographs, variable scales as shown.

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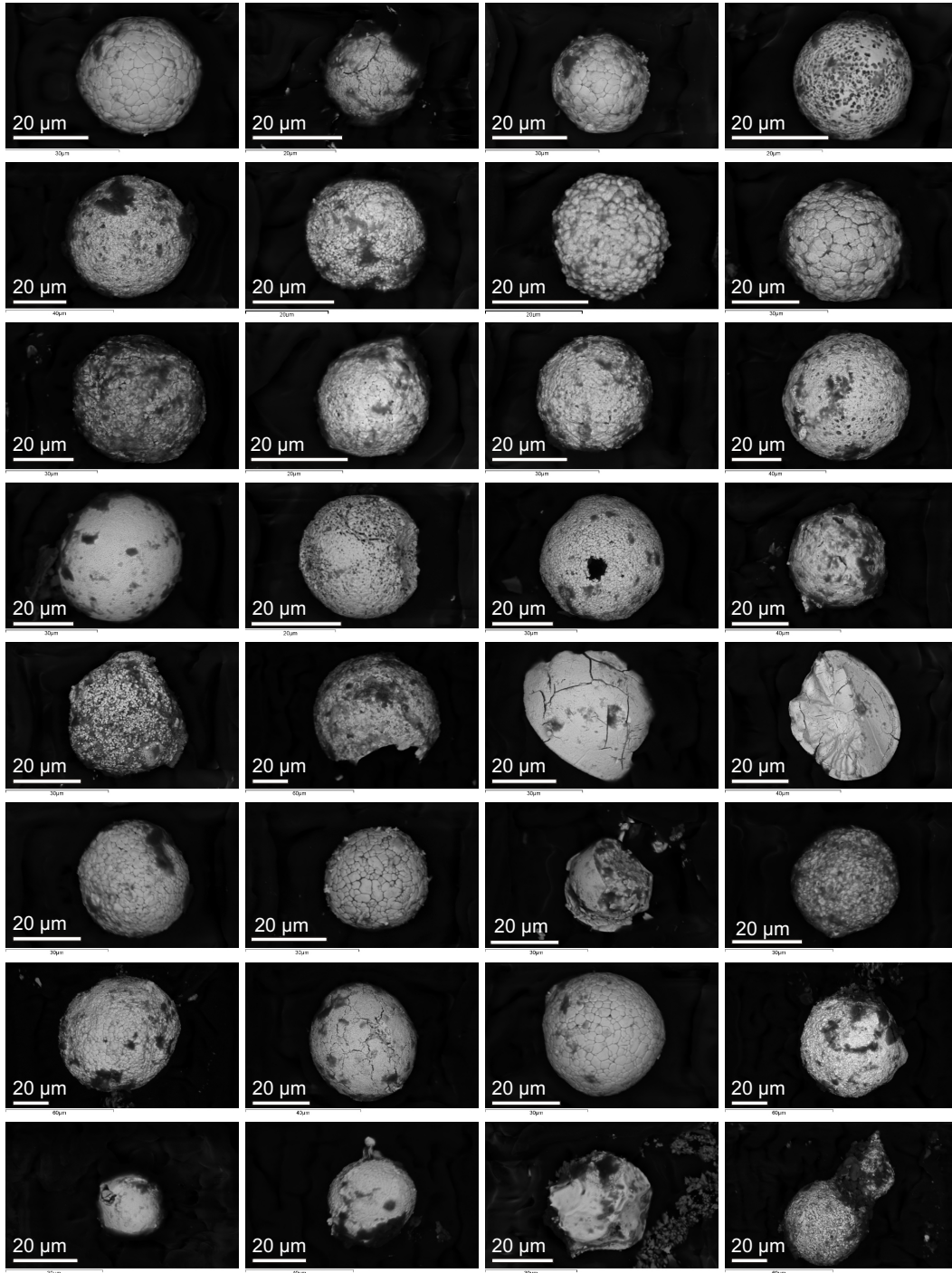
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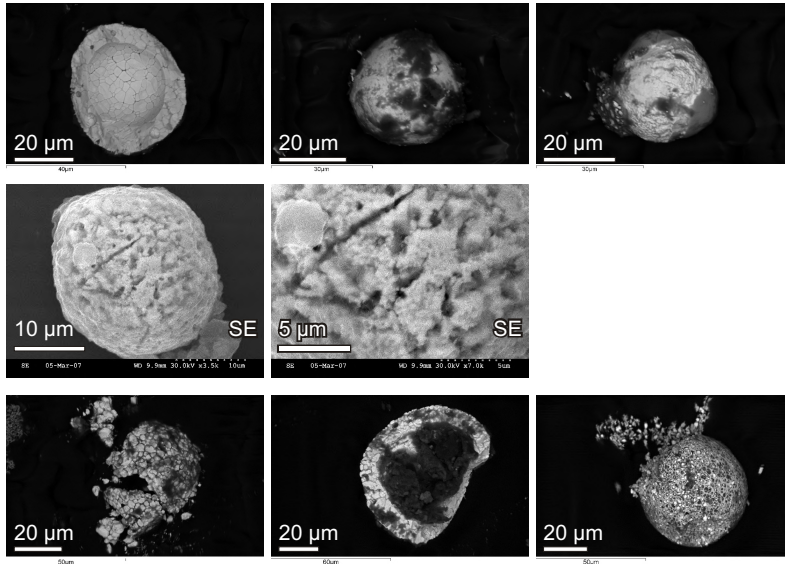


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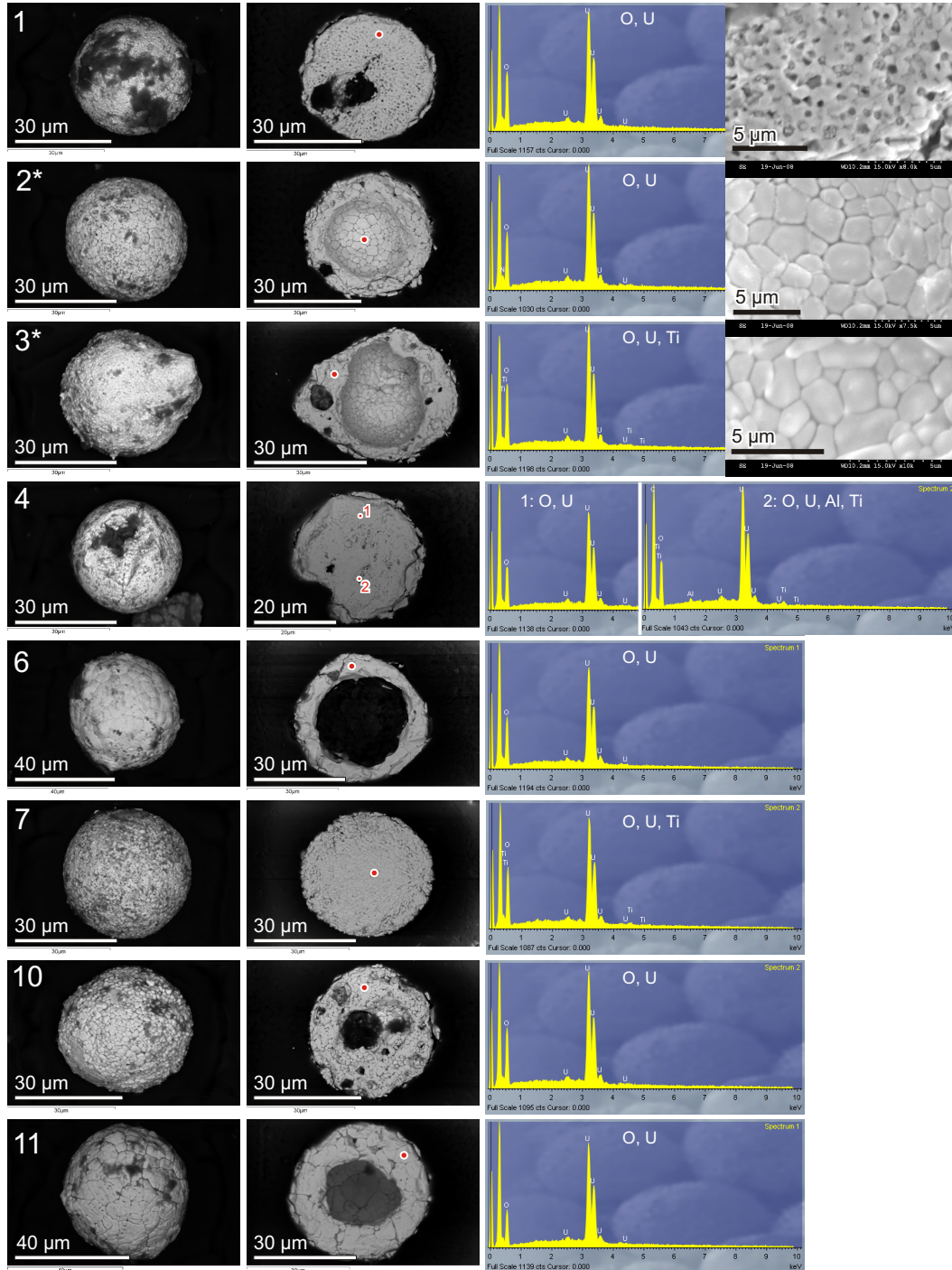
Appendix 2.2: Uranium oxide spheres collected from soil samples (wet environment). BSE mode SEM micrographs, variable scales as shown.

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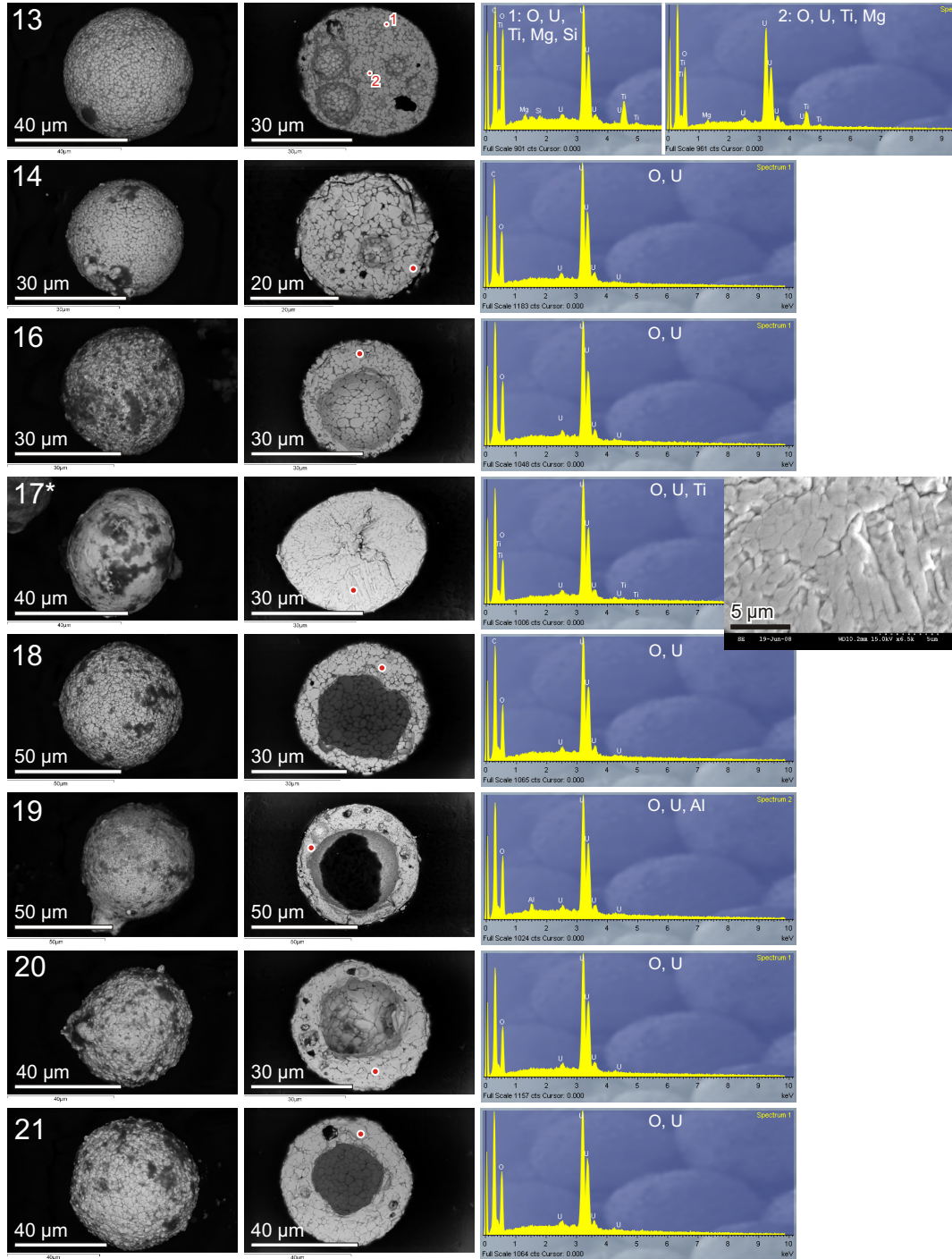
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Appendix 2.3: Uranium oxide spheres collected from dust samples (dry environment) and polished cross-sections (BSE mode SEM micrographs, variable scales as shown). EDX spectra from dot marked left (keV scale, with elemental peaks identified). Those asterisked were analysed by XAS.



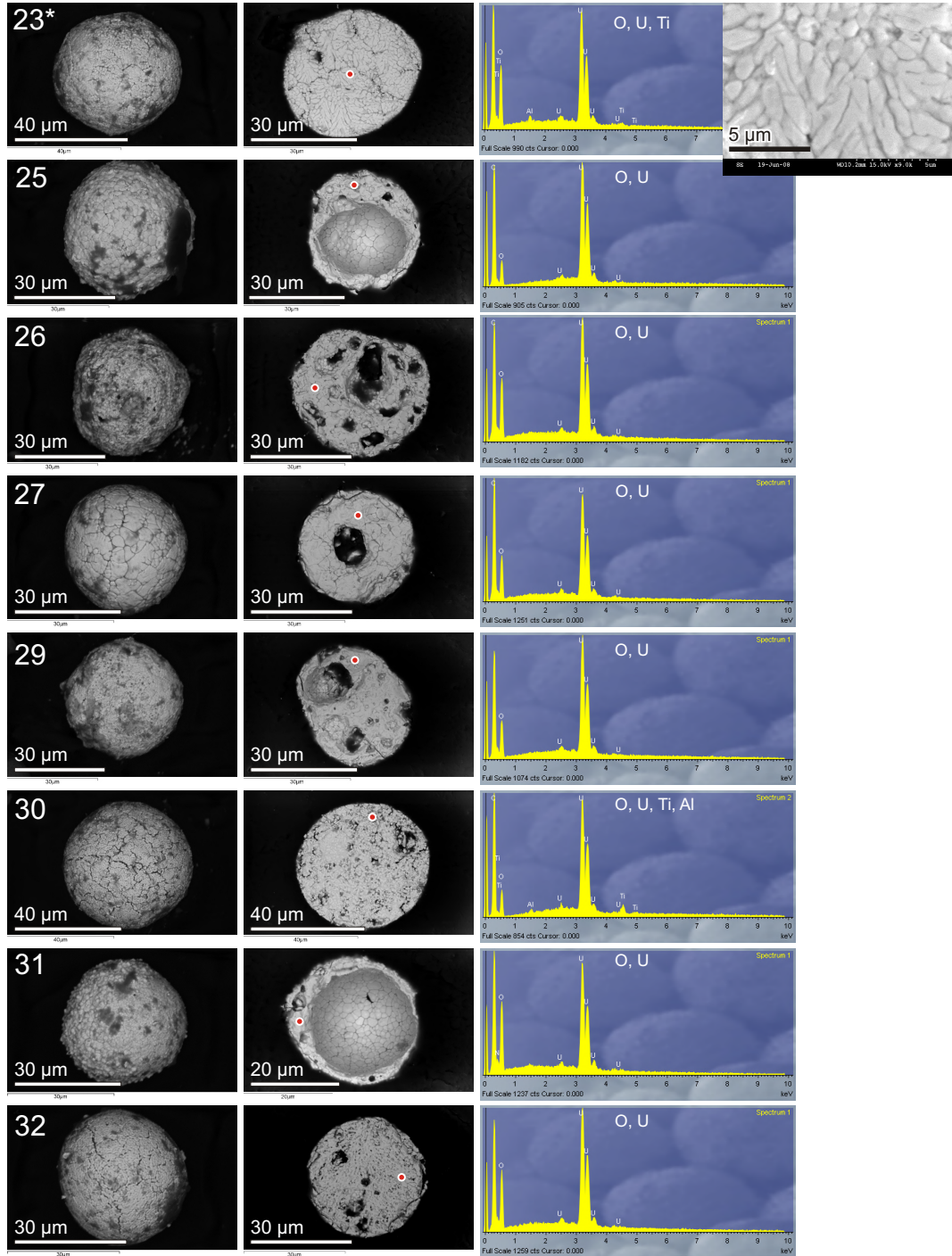
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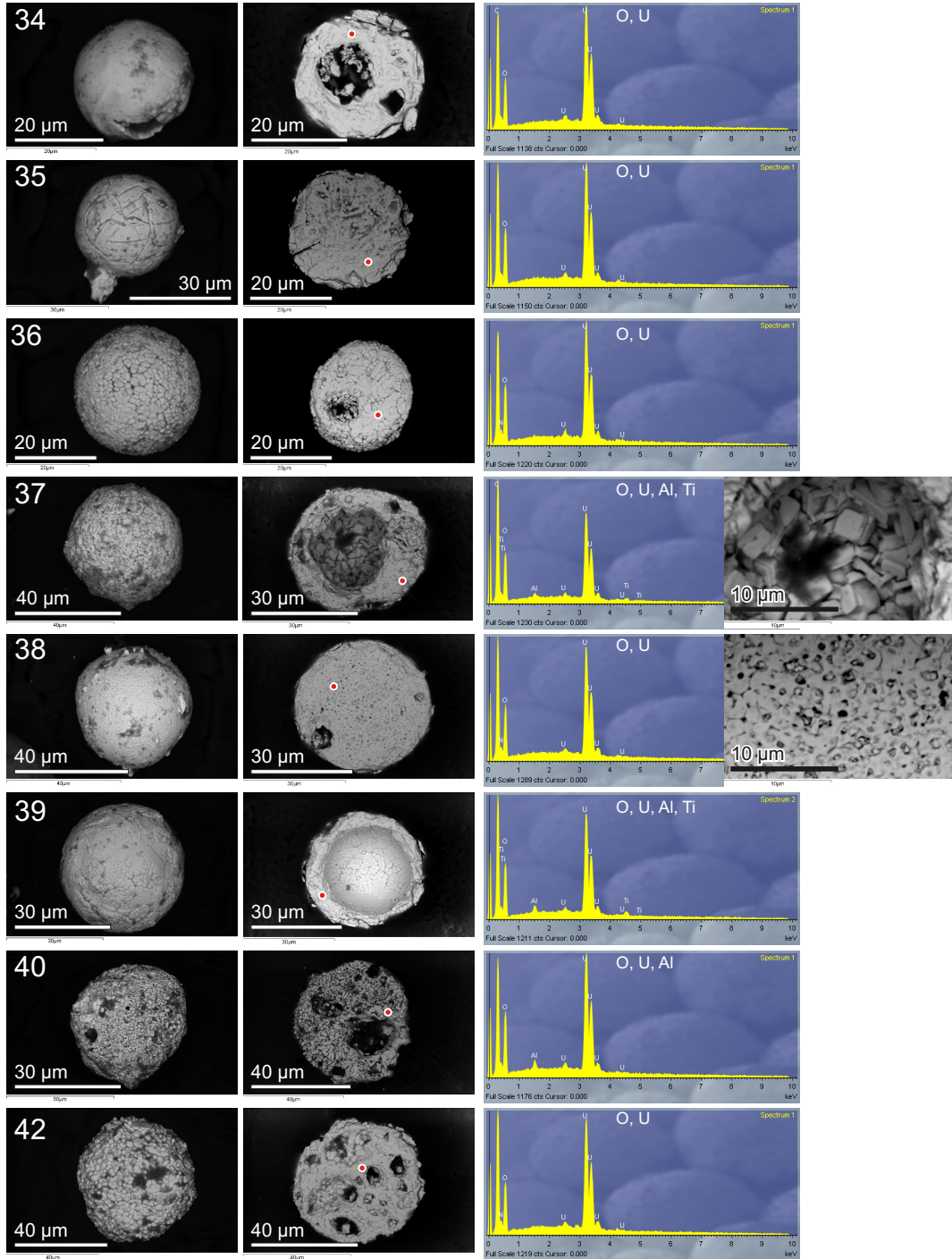


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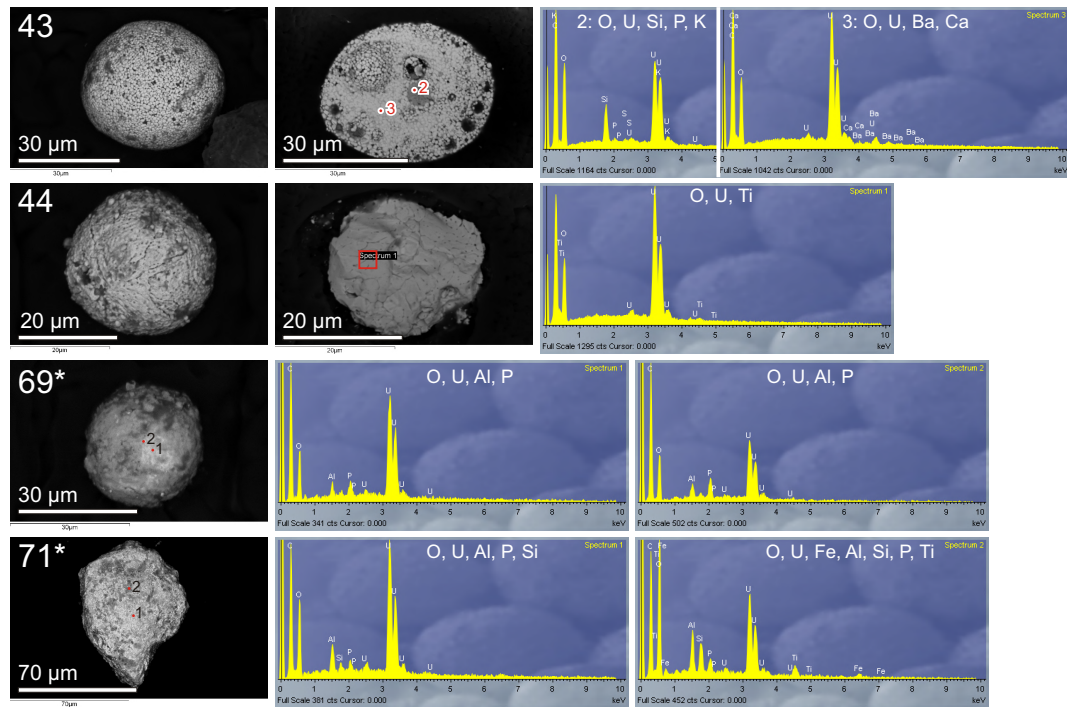
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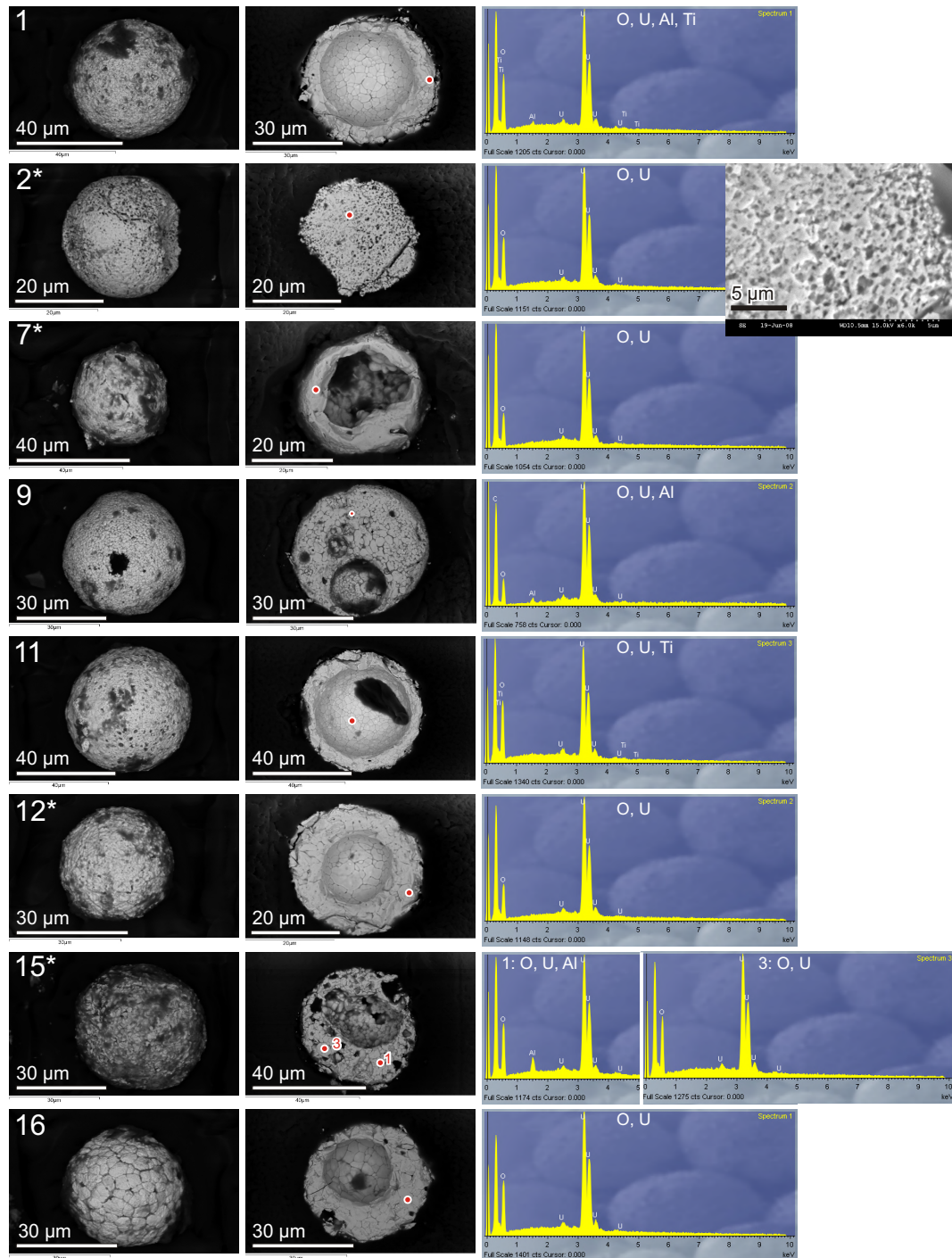
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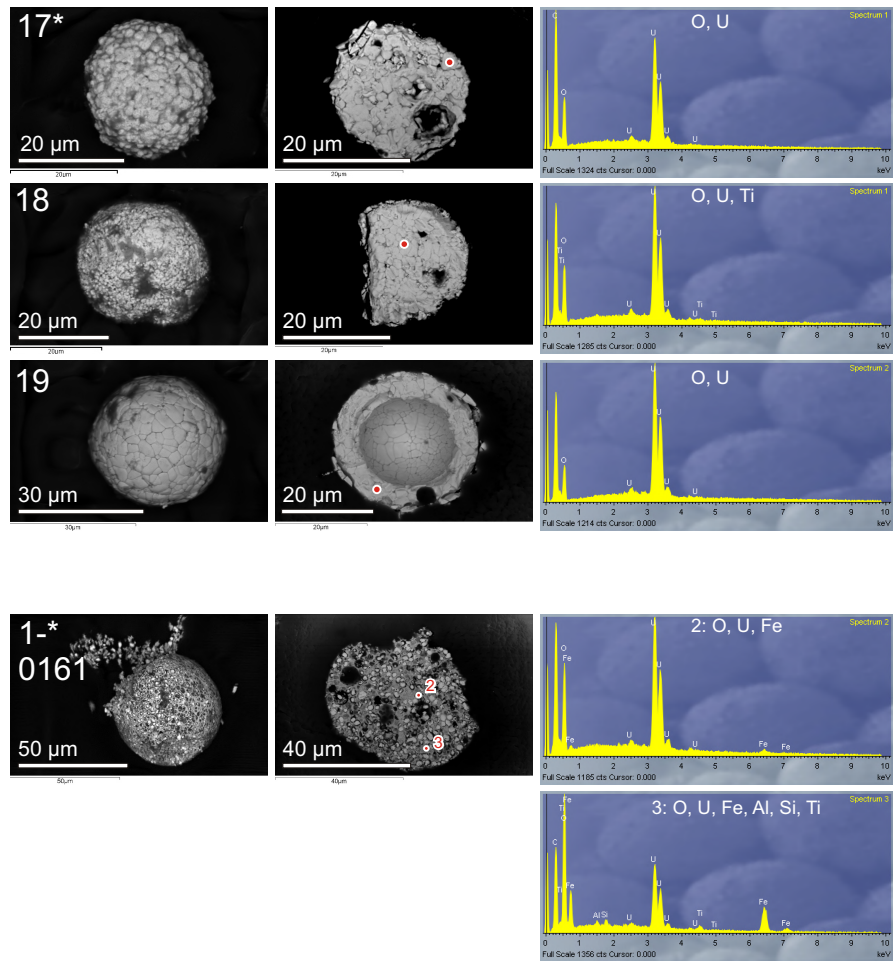
LLOYD *ET AL.*, 2009. MORPHOLOGIES AND COMPOSITIONS OF DU PARTICLES



Appendix 2.4: Uranium oxide spheres collected from soil samples (wet environment) and polished cross-sections (BSE mode SEM micrographs, variable scales as shown). EDXA spectra from dot marked left (keV scale, with elemental peaks identified). Those asterisked were analysed by XAS.

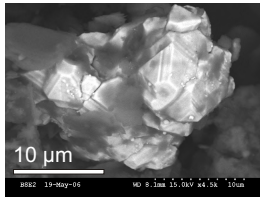


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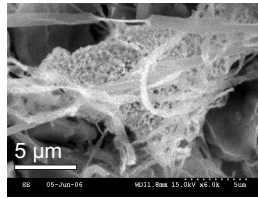


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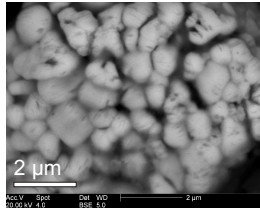
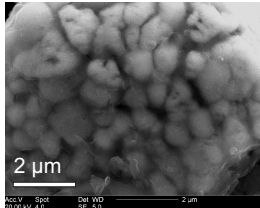
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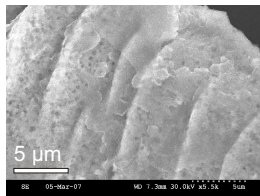
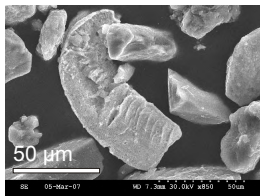
Left: cubic uraninite crystals ( $UO_2$ ). Only example identified.



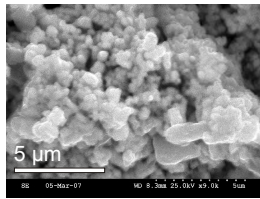
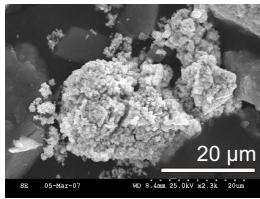
Left: aggregate of fine uraniferous particulate on wood sample (fungal filaments foreground).



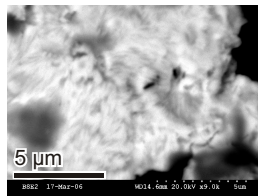
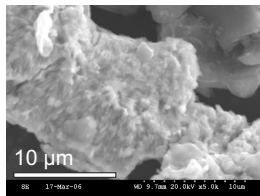
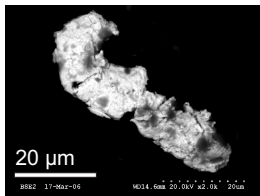
Left: non-compacted aggregate of uraniferous fine particulate (sub-micrometer diameter uranium oxide blebs).



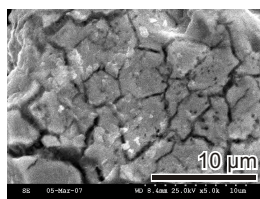
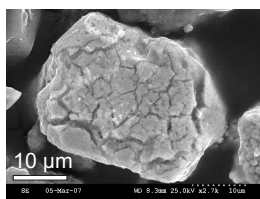
Left: Possibly an oxidised uranium metal turning, with evidence of shear. Or fragment from a micro-sphere.



Left: fluffy agglomerate of fine uraniferous particulate (loosely adhered).

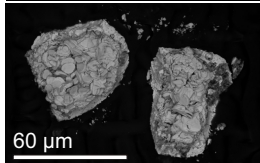


Left: uranium oxide particle with interlocking polycrystalline texture.



Left: uranium oxide particle with desiccation like texture, similar to metaschoepite (from schoepite precipitate) described in Buck et al. (2004).

Buck, B.J., Brock, A.L., Johnson, W.H., and Ulery, A.L. (2004) Corrosion of depleted uranium in an arid environment: Soil-geomorphology, SEM/EDS, XRD, and electron microprobe analyses. *Soil and Sediment Contamination*, 13, 545-61.

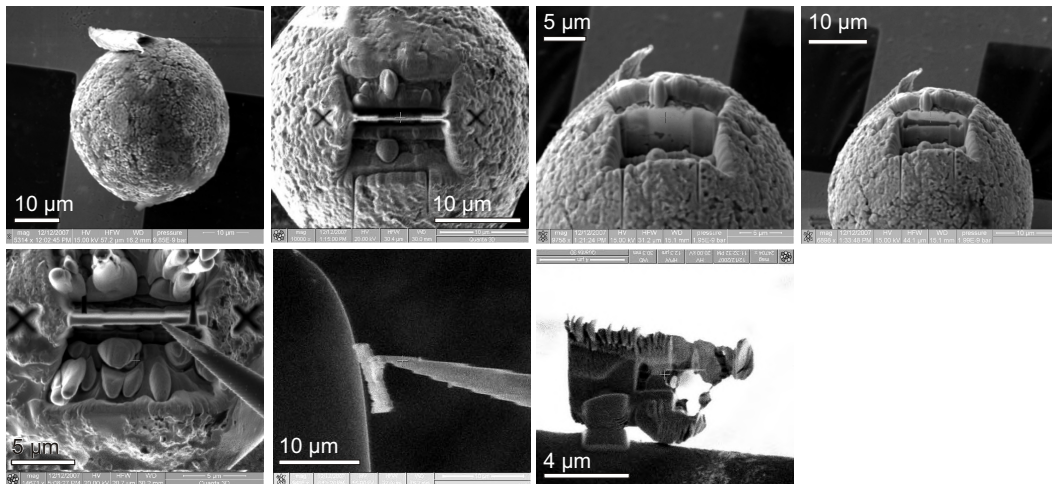


Left: pseudo-hexagonal platy uranium oxide mineral, similar to schoepite, probably a secondary precipitate.

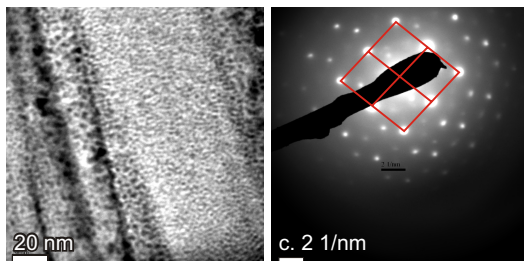
Appendix 2.5: Supplementary SEM micrographs of uranium oxide grains from soil and dust samples.

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Double focussed ion-beam (FIB-) SEM particle dissection, used to extract a wafer for TEM analysis. Operated by J. C. Bridges (University of Leicester).



Transmission electron microscopy (TEM: JEOL JEM-2100) and selected area electron diffraction (SAED). Operated by H. Changela (University of Leicester).

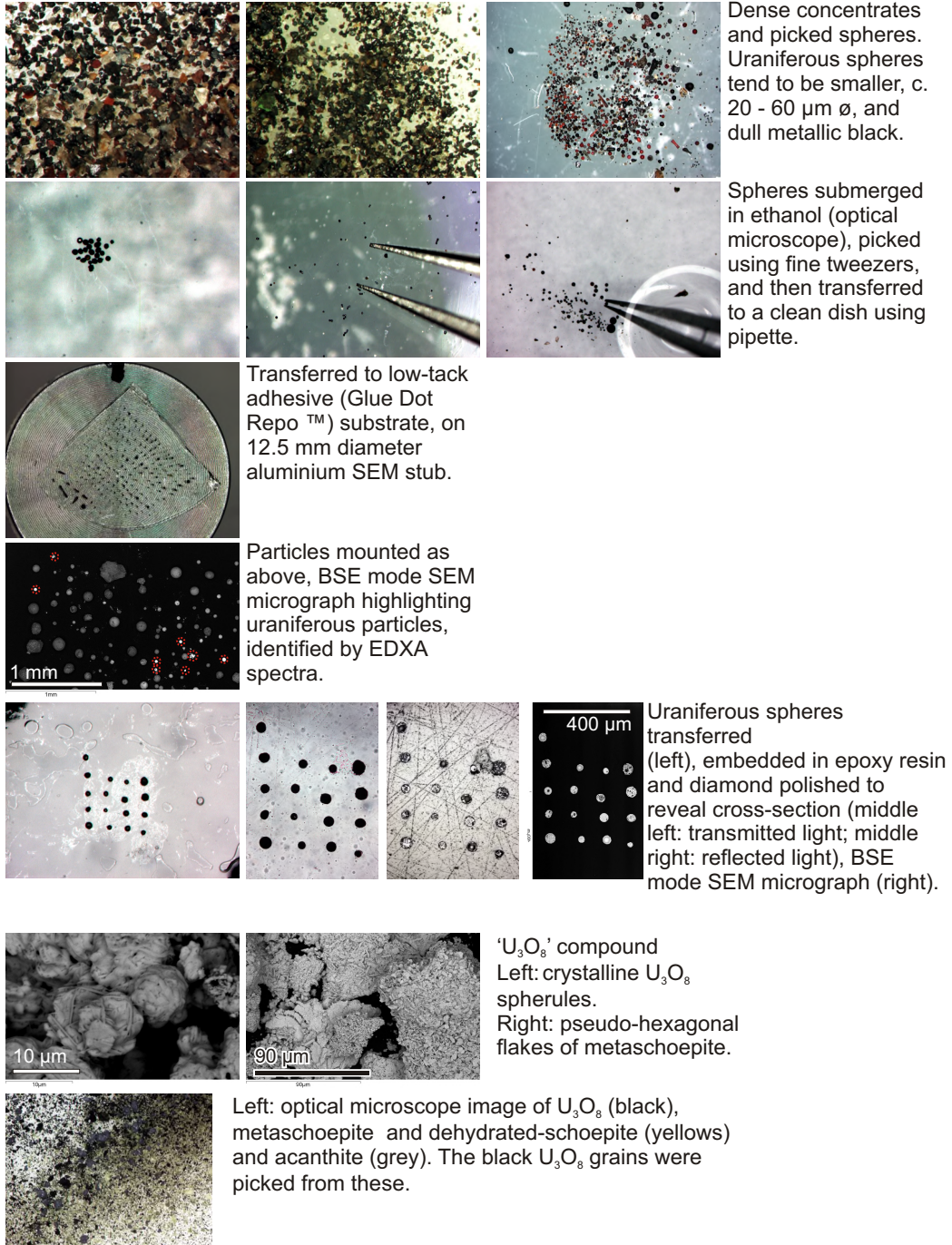


Left: electron diffraction pattern, uncalibrated scale (200 kV, L= 25 cm). Probably from distorted cubic (FCC) lattice, [011] plane; hyperstoichiometric  $UO_2$ .

Appendix 2.6: Uranium oxide micro-sphere dissection by FIB-SEM, with TEM electron diffraction pattern from extracted wafer.

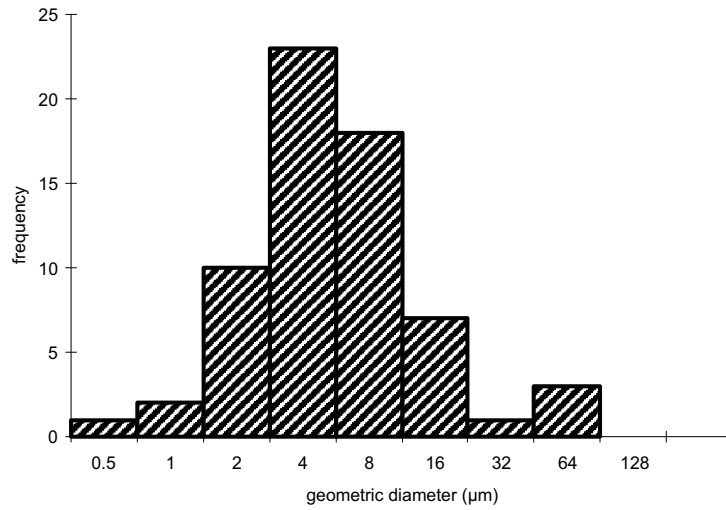


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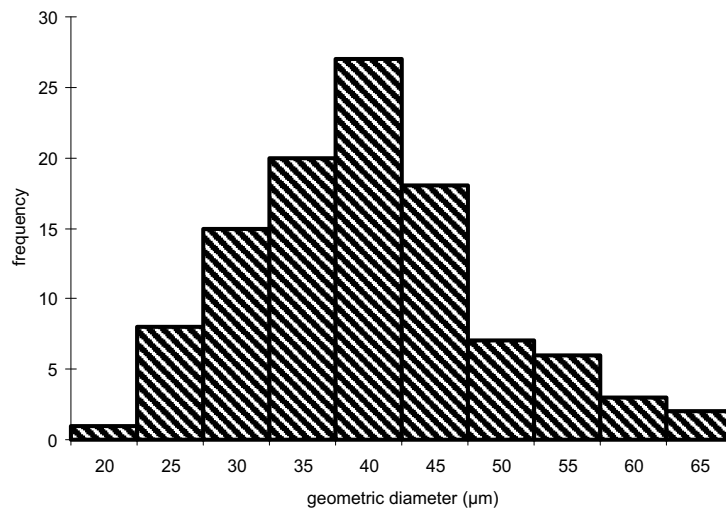


Appendix 2.7: Sample preparation process, picking and mounting particles (SEM and optical micrographs). Analysis of 'U<sub>3</sub>O<sub>8</sub>' compound for XAS standard.

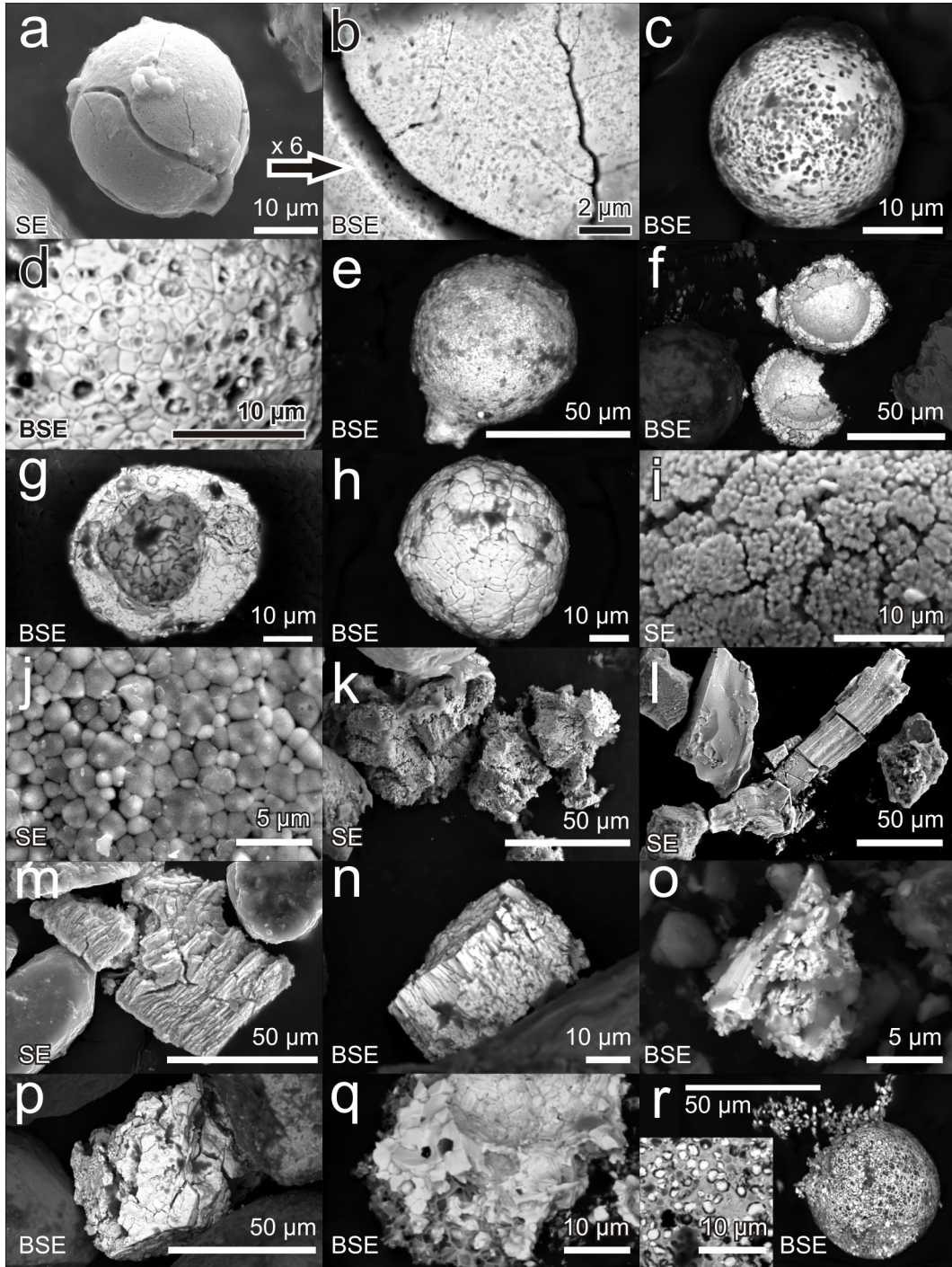




Unimodal particle size distribution of raw dust samples analysed by SEM. Demonstrating log-normal distribution of geometric diameters, which is typical for atmospheric particulate matter (coarse particle size range). Note that smaller particles are increasing less likely to be located during searches using SEM, biasing the data, and probably excluding the accumulation mode, fine particles.



Particle size distribution of the identified uranium oxide spheres, showing an approximately normal distribution of geometric diameters. Note that the data are inherently biased, smaller particles do not readily settle during the dense liquid separation, some of the samples were also sieved (<40 µm).



Reprint of Figure 3 from the main article. SEM images of uraniumiferous particles from dust and soil samples, showing a range of primary morphologies and textures, which are discussed in the article. Those from soils samples: c, d, k, n, q & r.