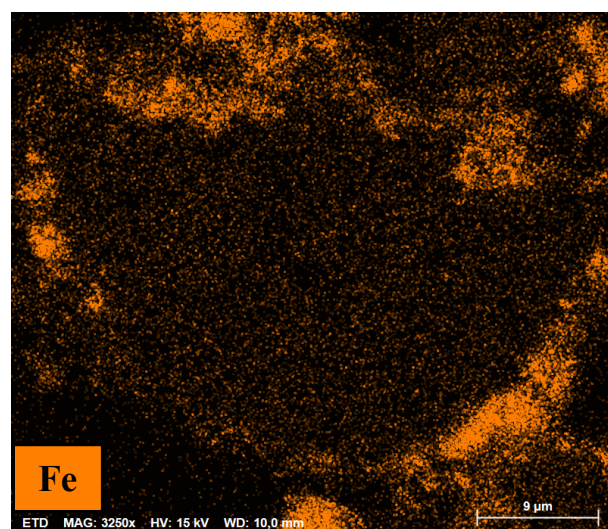
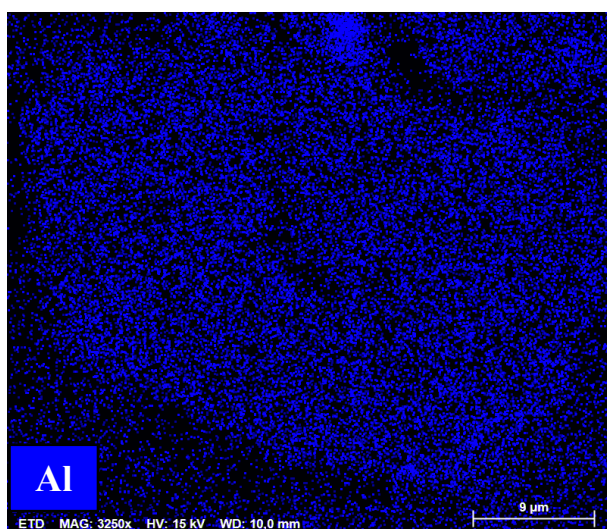
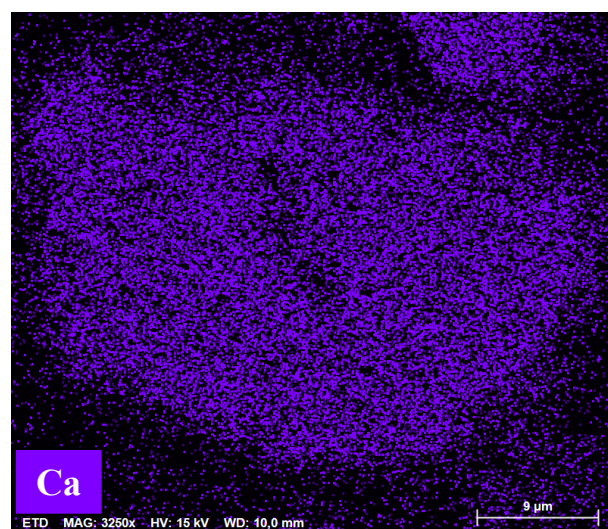
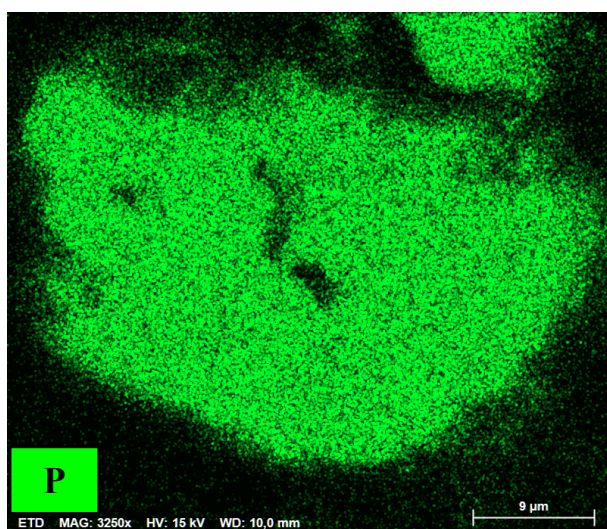
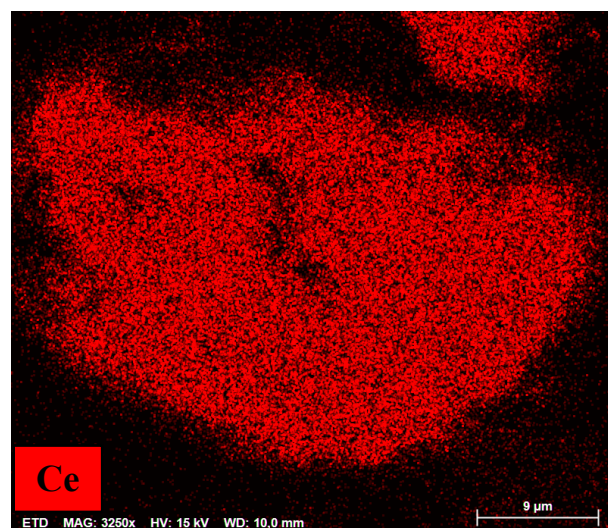
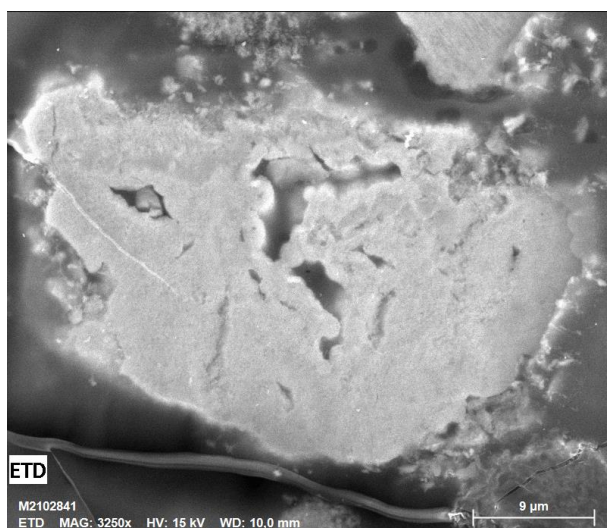


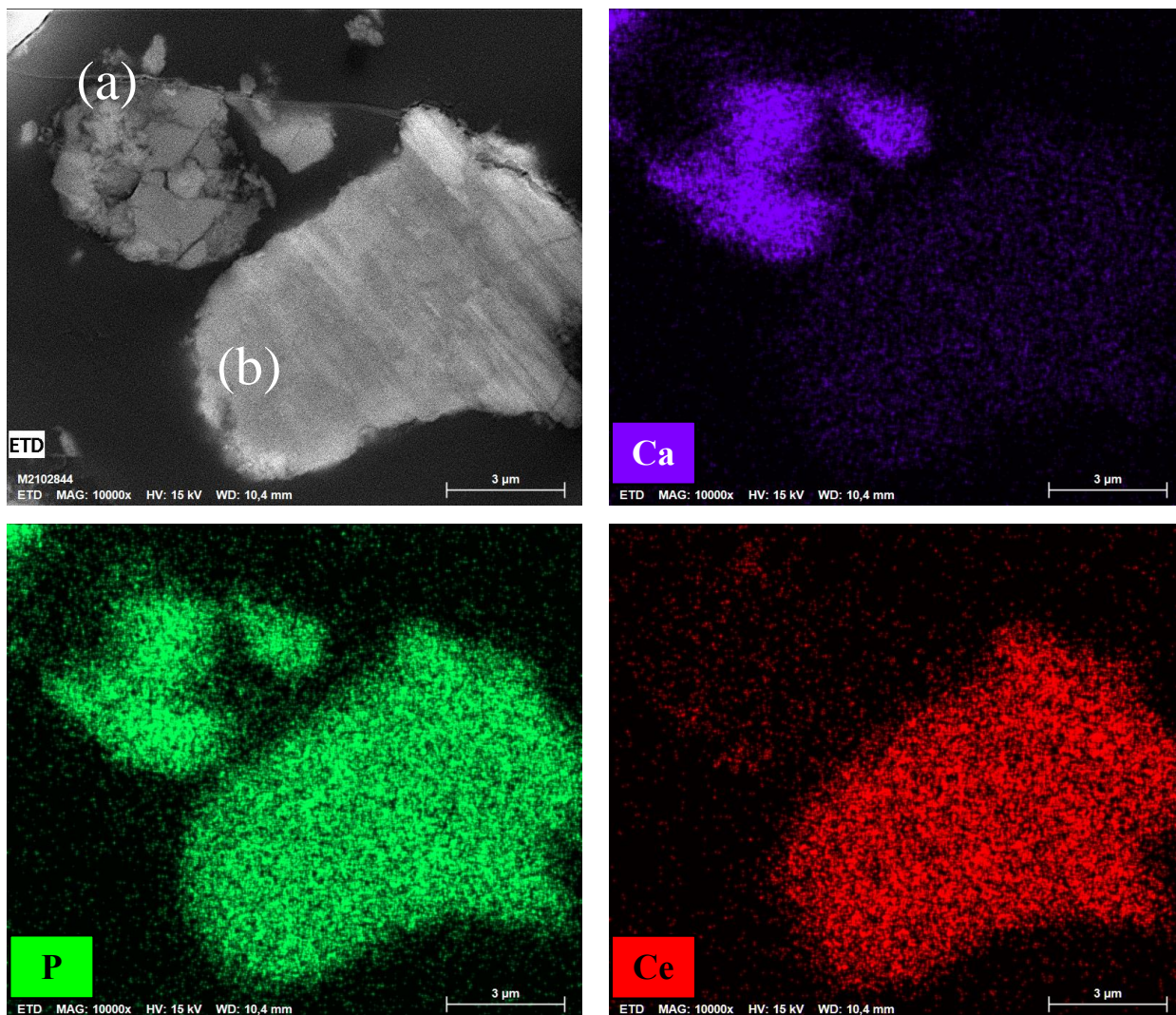
**Figure S1** – Chemical mapping by EDS of the polished section for the monazite particle of the as-received BEDE sample.



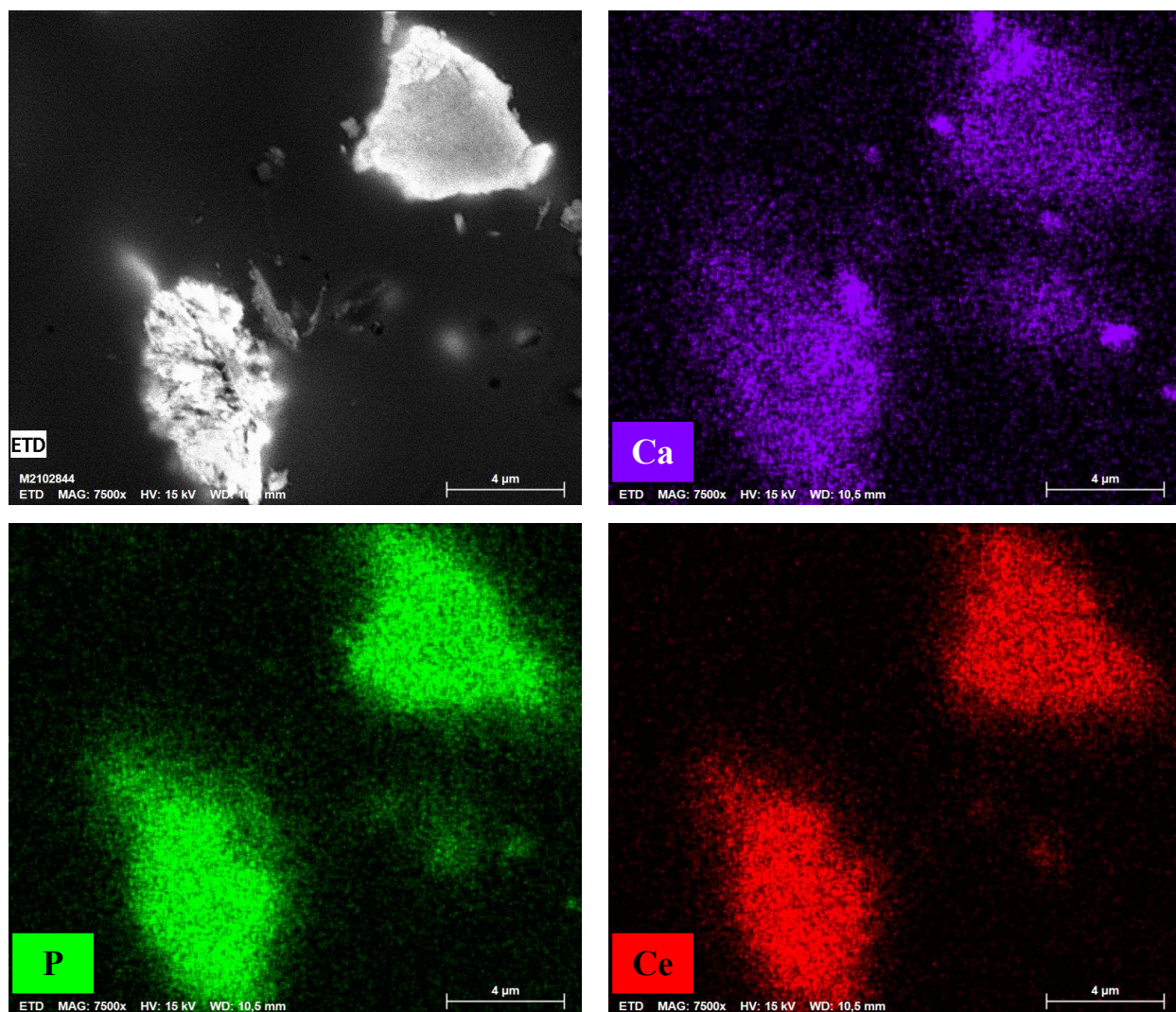


**Figure S2** – Chemical mapping by EDS of the polished section of crandallite particle of the as-received BEDE sample.

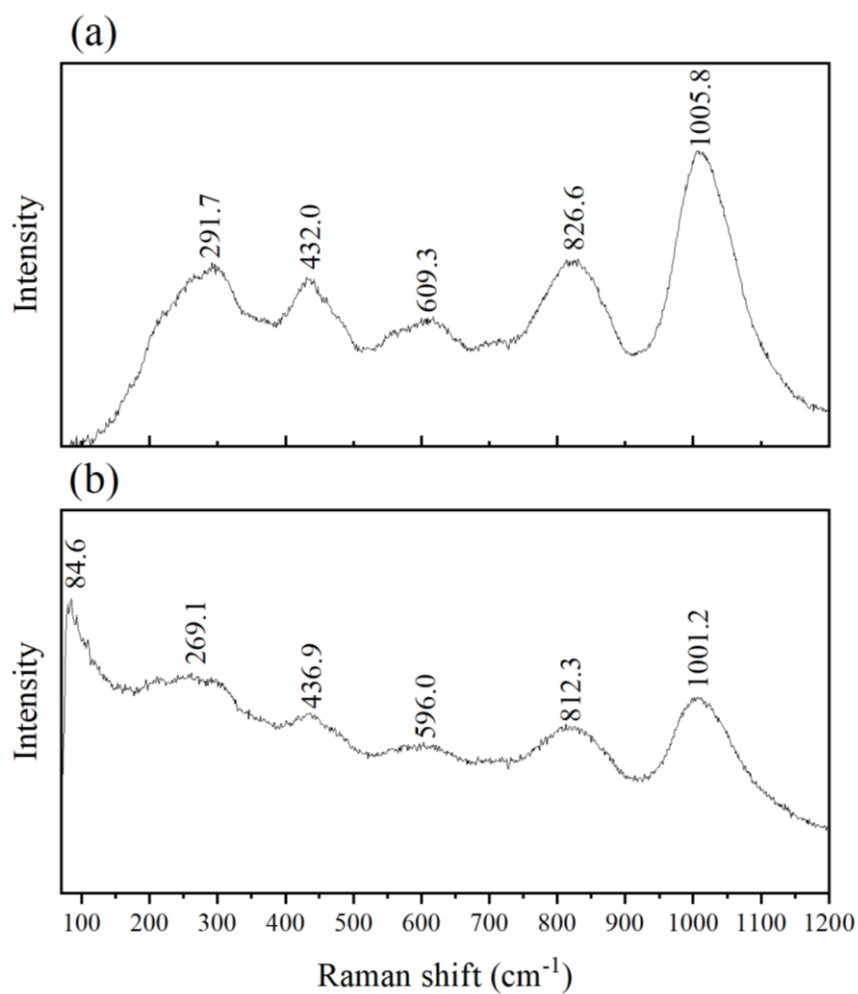




**Figure S3** – Chemical mapping by EDS of the polished section of (a) calcium phosphate (likely fluorapatite) and (b) monazite particle of the as-received SILX sample.



**Figure S4** – Chemical mapping by EDS of the polished section of calcium-cerium phosphate (likely fluorapatite) particle from the as-received SILX sample.



**Figure S5**– Raman spectra of the identified solid precipitated in the final stored solution from the dissolution step of the sulfation product. (a) and (b) hydrated iron phosphate (Larroumet et al., 2008). (Leaching condition:  $0.9 \text{ mol L}^{-1} \text{ H}_2\text{SO}_4$  solution,  $25^\circ\text{C}$  for 2 hours, final  $\text{pH} = 0.8$ ).