

Supplementary Material S

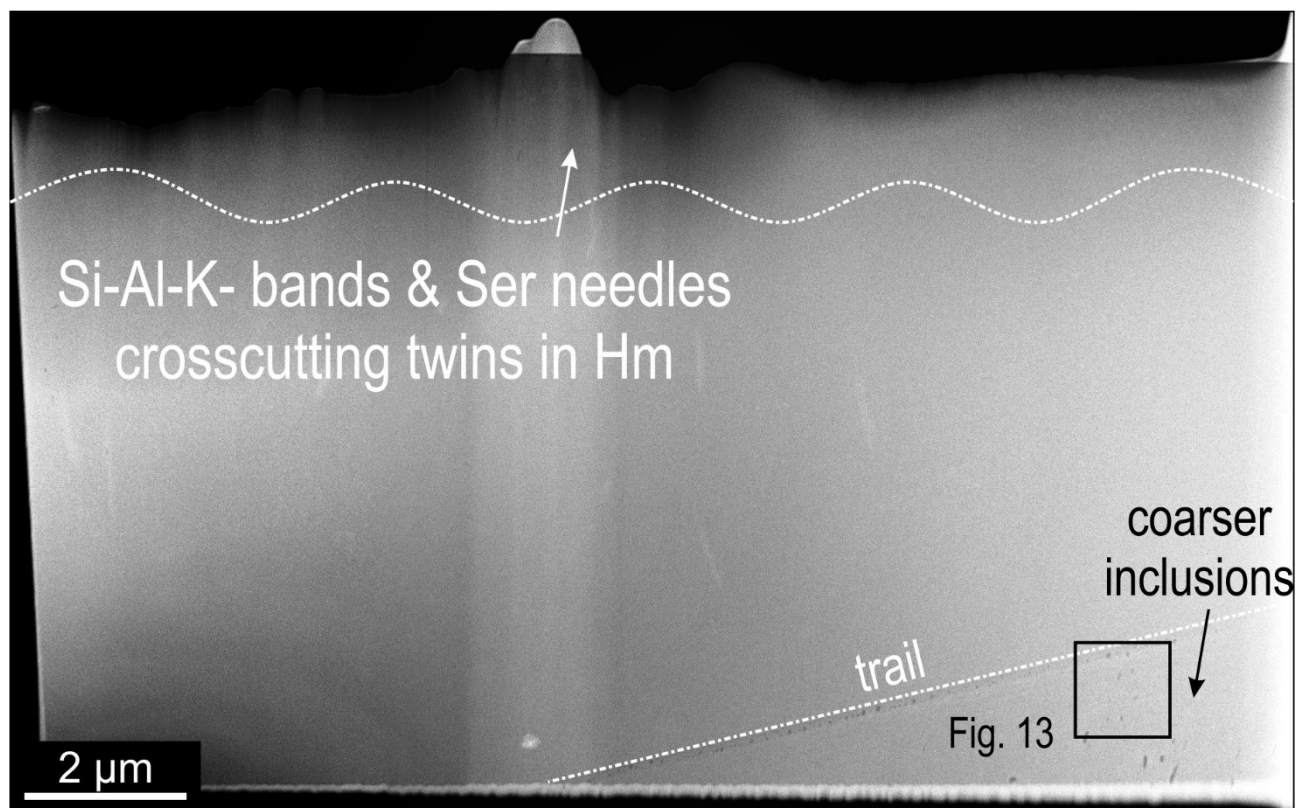


Figure S1. Low-magnification HAADF STEM image of the foil (foil #4) from the weave-twinned hematite showing areas of interest. Ser-sericite; Hm-hematite.

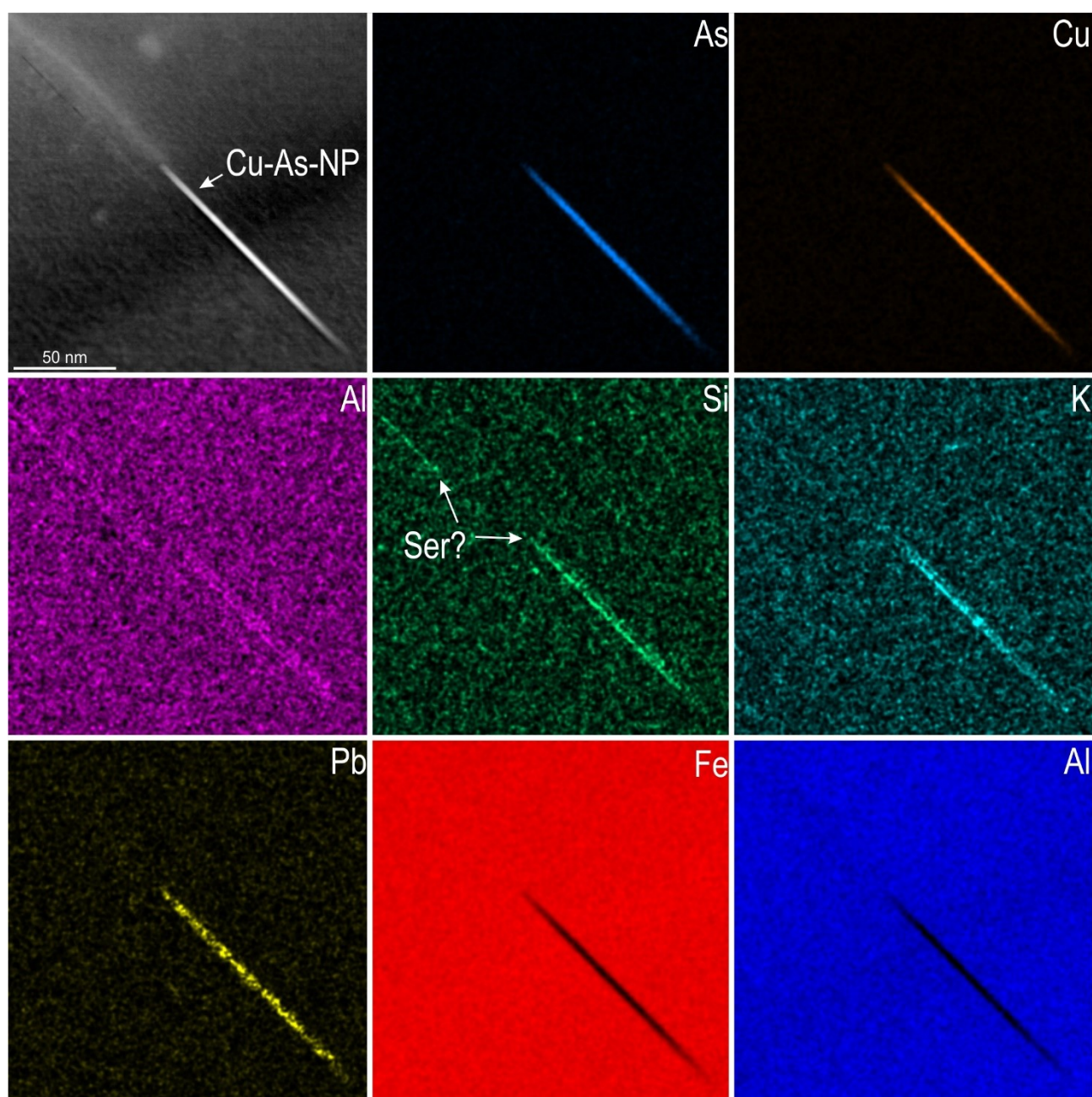


Figure S2. HAADF STEM and STEM EDX maps of Cu-As NP with acicular morphology hosted within bright band (foil #1). Note the presence of Si, K and Al surrounding the margins of the needle and/or proximal to it. Ser-sericite.

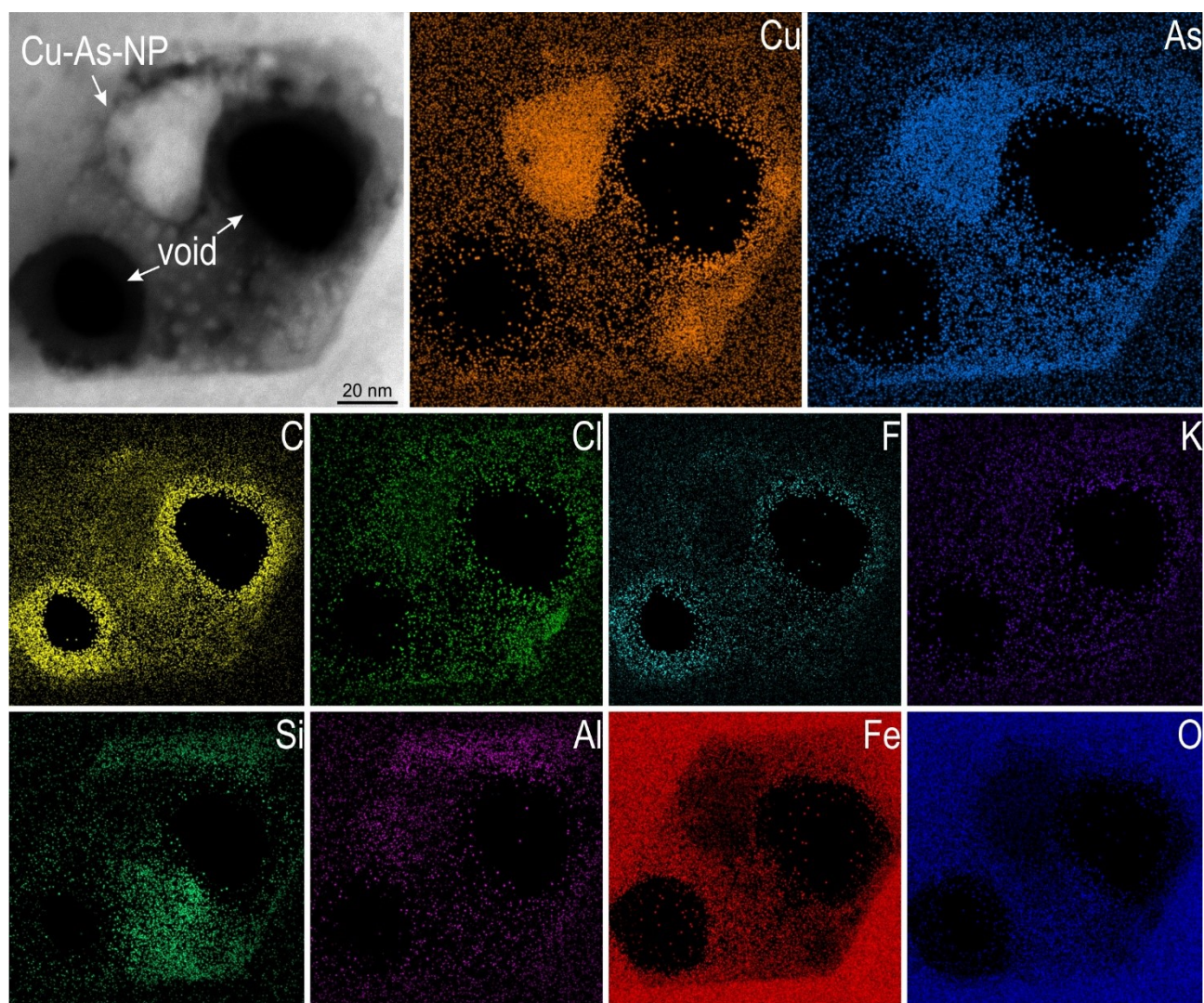


Figure S3. HAADF STEM and STEM-EDX maps of hexagonal cavity in Foil #3 (domain B) featuring the presence of voids and a Cu-As NP. Though F-K α partially overlaps with Fe-L α in the lower energy spectrum, note that enrichment of F is observed within the cavity, rather than outside, in the host hematite.

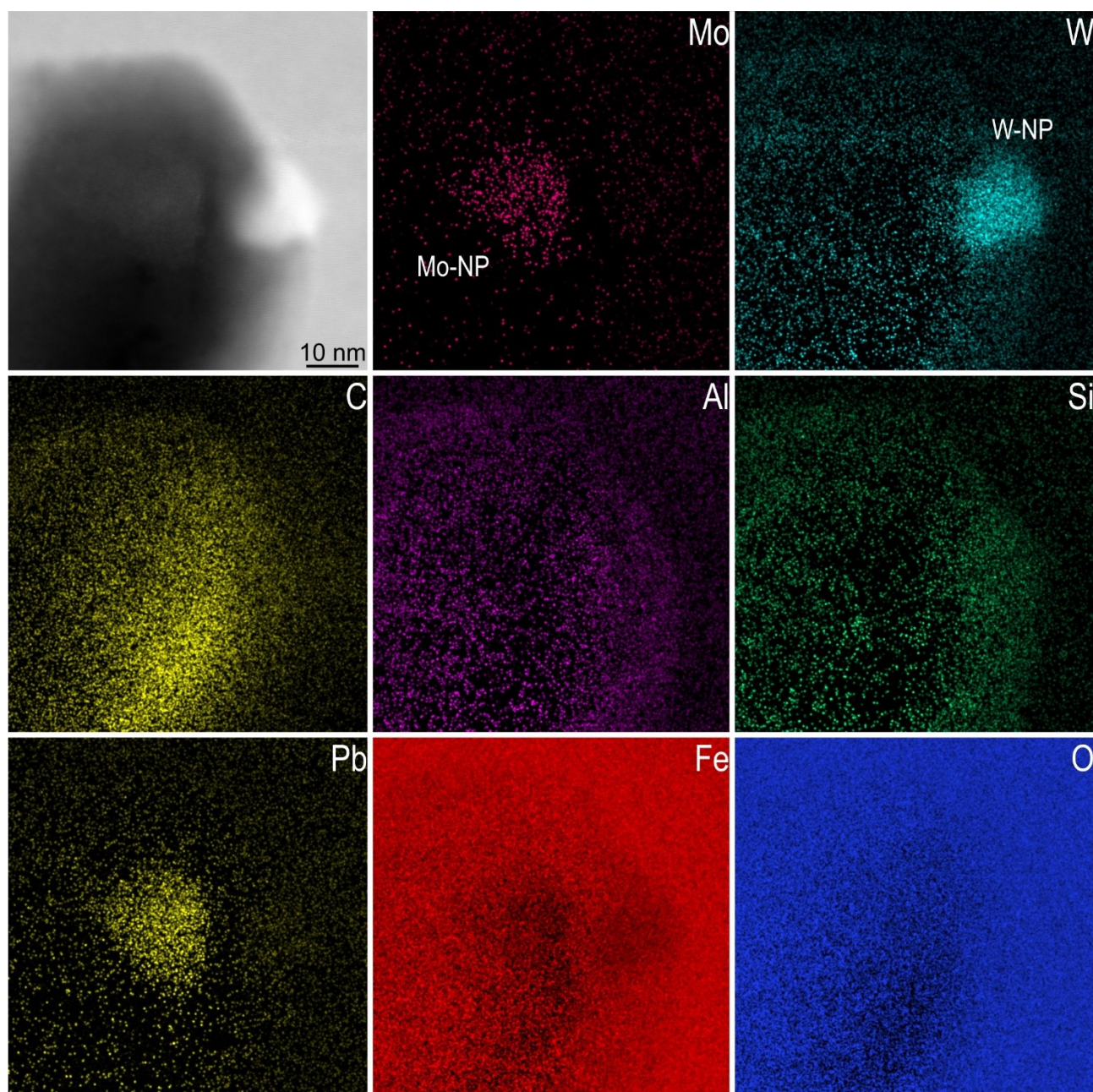


Figure S4. HAADF STEM and STEM-EDX maps of cavity hosting W- and Mo-bearing NPs (foil #3, domain B). Although the EDX peak position of Mo-L α partially overlaps with that of Pb M α , the presence of characteristic Mo-K α peaks is observed in the higher energy interval of the spectrum.

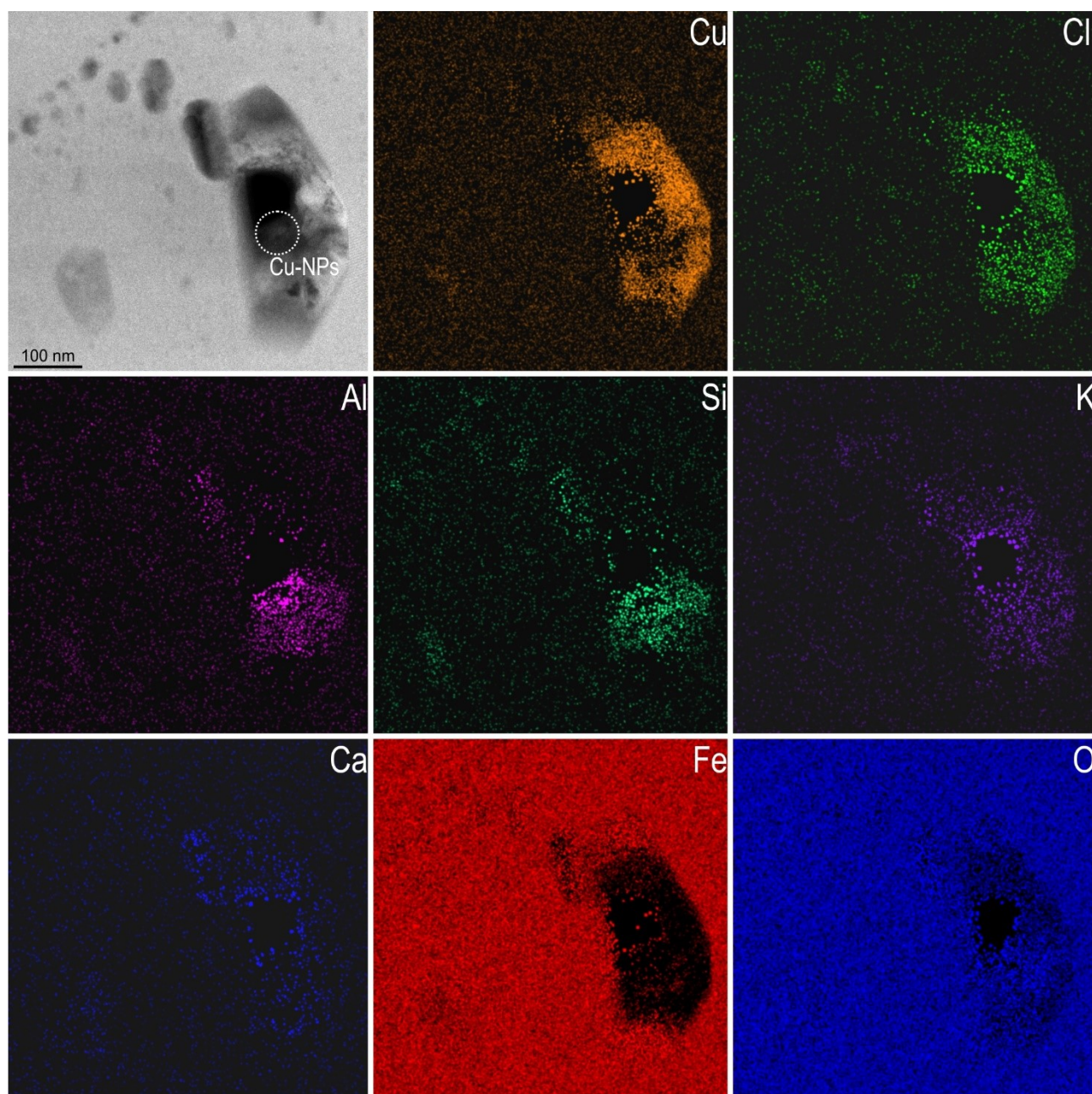


Figure S5. HAADF STEM and STEM-EDX maps of large cavity in foil #1 displaying the presence of a void and strong enrichment in Cu correlating with Cl. Native copper NPs are observed proximal to the void.

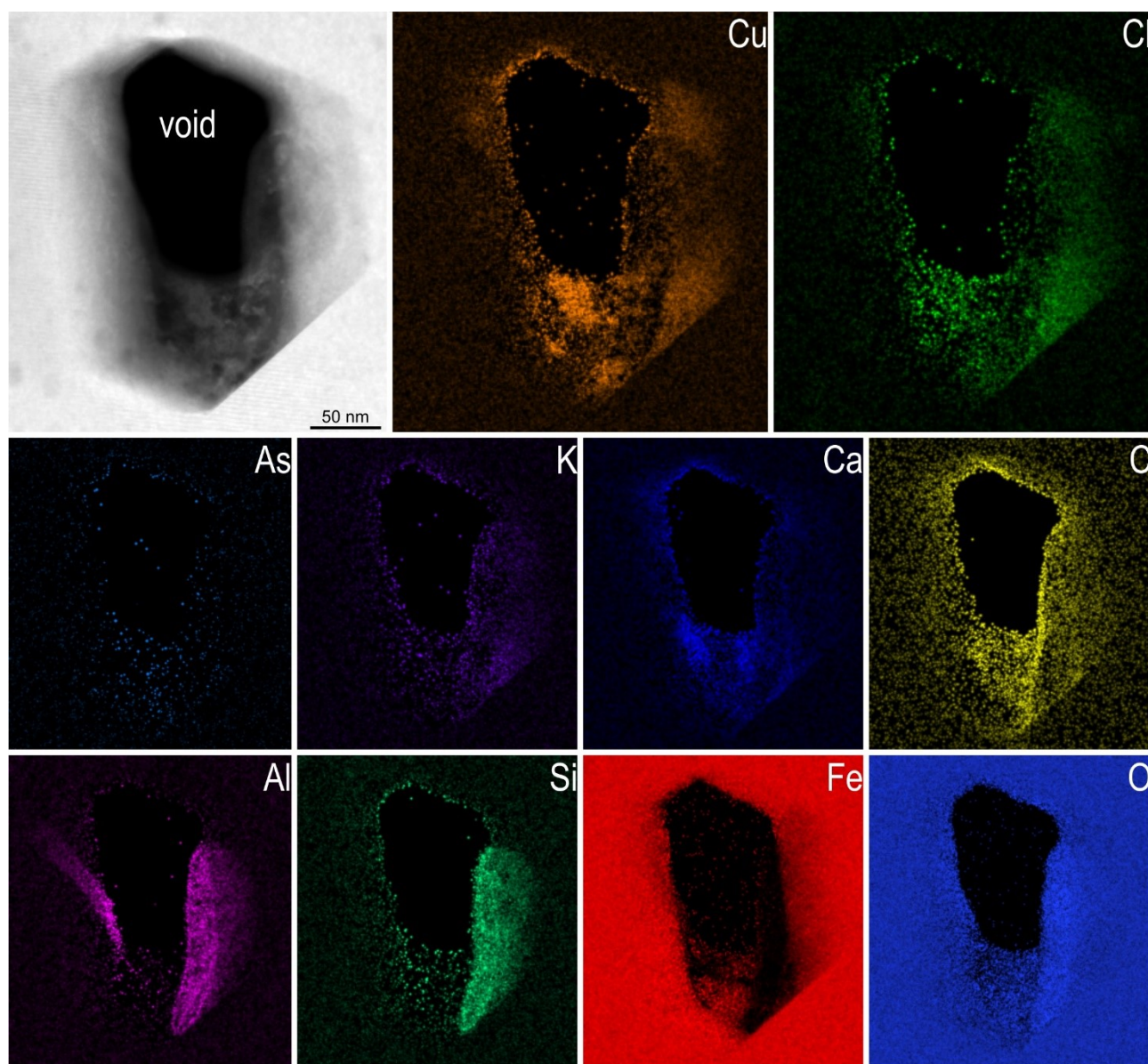


Figure S6. HAADF STEM and STEM-EDX maps of cavity in foil #2 (domain A) displaying the presence of a void and compositional heterogeneity within the inclusion (compare distributions of Ca *versus* Si and Al).

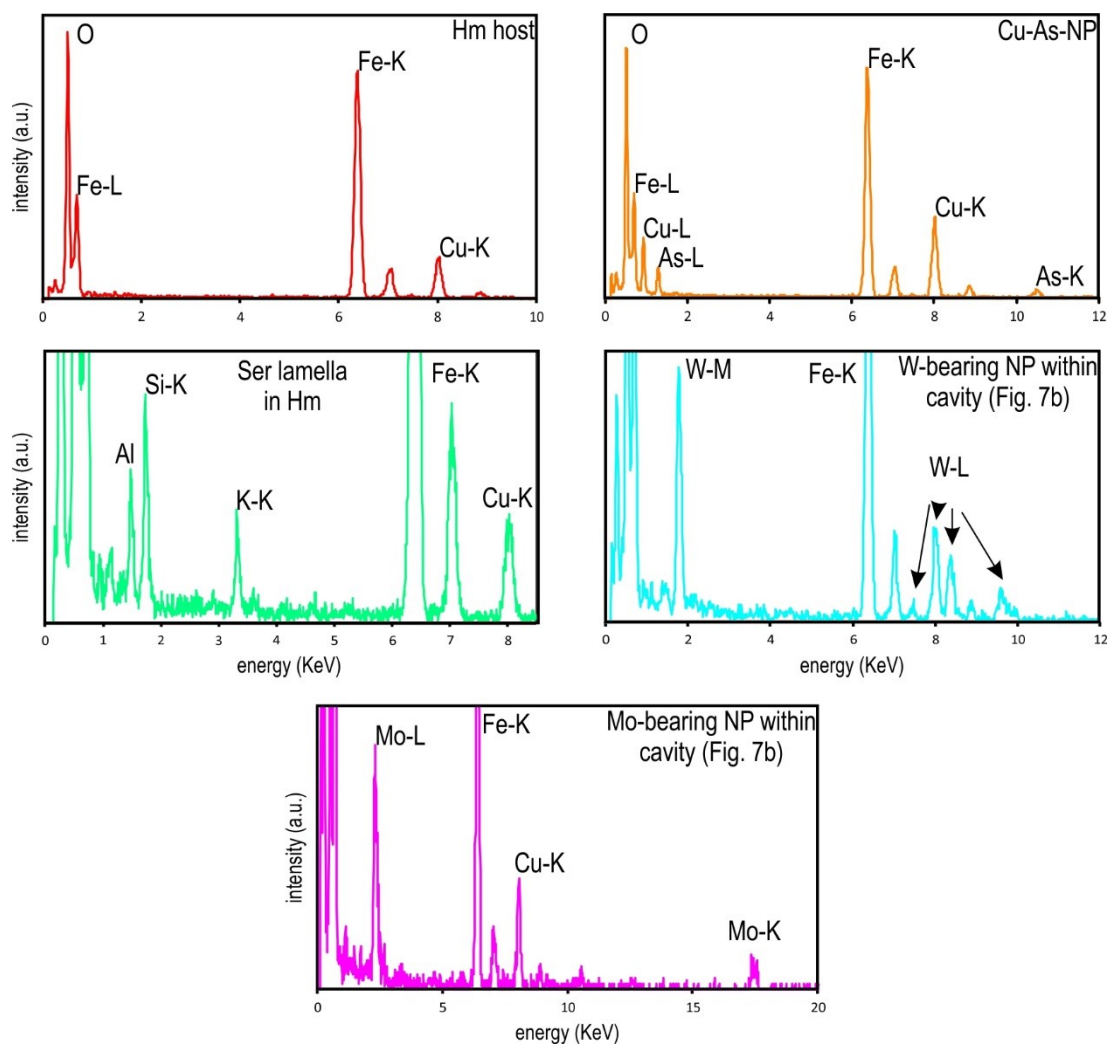


Figure S7. Representative STEM EDX spectra for observed NPs within cavities or directly hosted by hematite. The spectra are scaled individually to emphasise features of interest; typical hematite spectrum is shown (top left) for comparison. Note the relative differences between the Fe-K and Cu-K intensities in hematite host relative to the Cu-As-bearing NP.