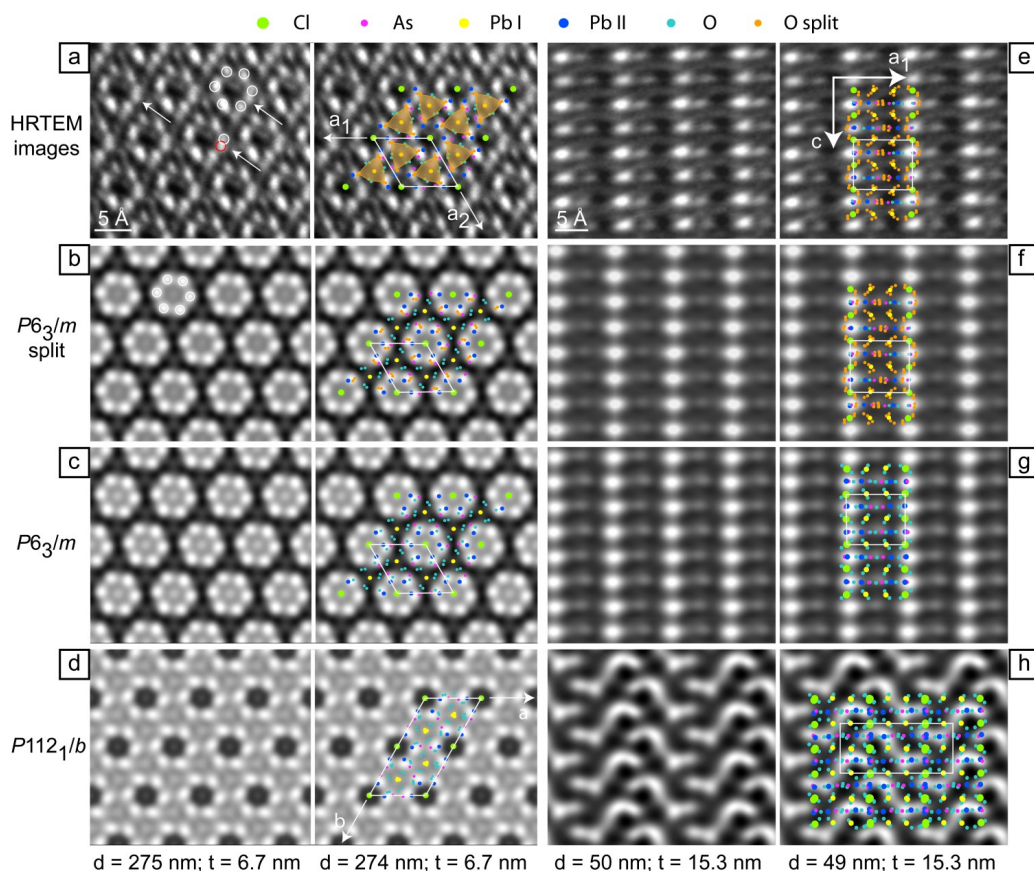
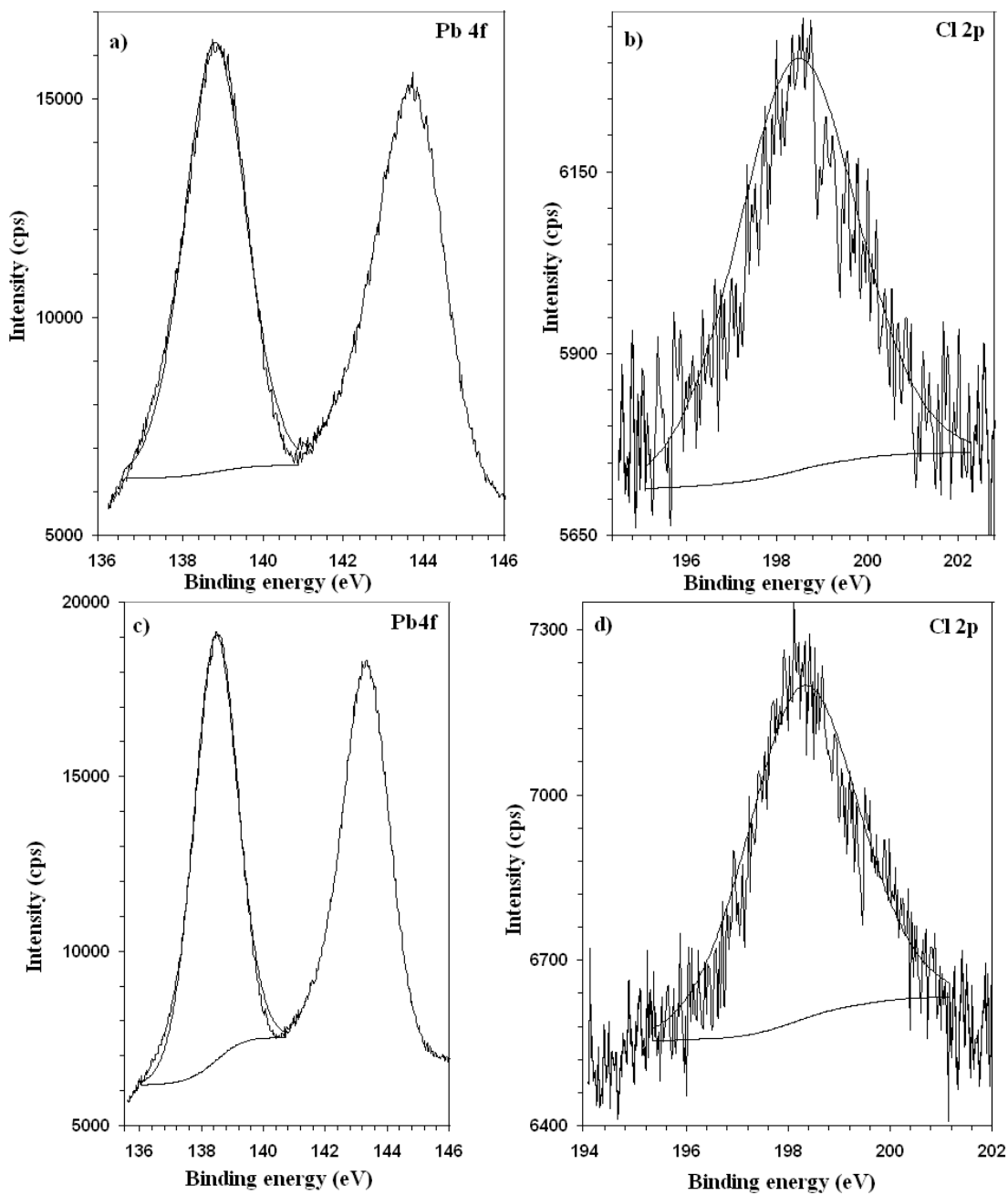


## Supporting Online Material



**Figure S1.** Comparisons between experimental HRTEM images and simulated ones. (a) and (e) are highly magnified  $[001]$  and  $[100]$  experimental images respectively: for both images the right side illustrates the superimposition of the real image with the reconstruct unit cell content projected after simulation for the  $O_3$  split hexagonal model shown in (b) and (f) respectively. Using the (b) simulation, the white circles on the left side of (a) represent the spatial contrast distribution of the projected atomic columns related to the  $[AsO_4]^{3-}$  and  $[Pb^{(II)}O_6]^{10-}$  groups, the red circles together with the white arrows underline the possible split into two not fully resolved components of what is supposed to be a single white circle. (c) and (d) are simulations and unit-cell projection reconstructions along  $[001]$  while (g) and (h) are simulations and cell content reconstruction along  $[100]$

for common hexagonal  $P6_3/m$  and monoclinic  $P112_1/b$  structures respectively. For all the figures the unit-cell projection is drawn in white.



**Figure S2.** High resolution curve fitted XPS spectra of Pb (*4f*) **(a)** and Cl (*2p*) **(b)** in mimetite and **(c)** and **(d)** in finnemanite.