

Supporting Information

Photo-electrochemical properties of CuO–TiO₂ heterojunctions for glucose sensing

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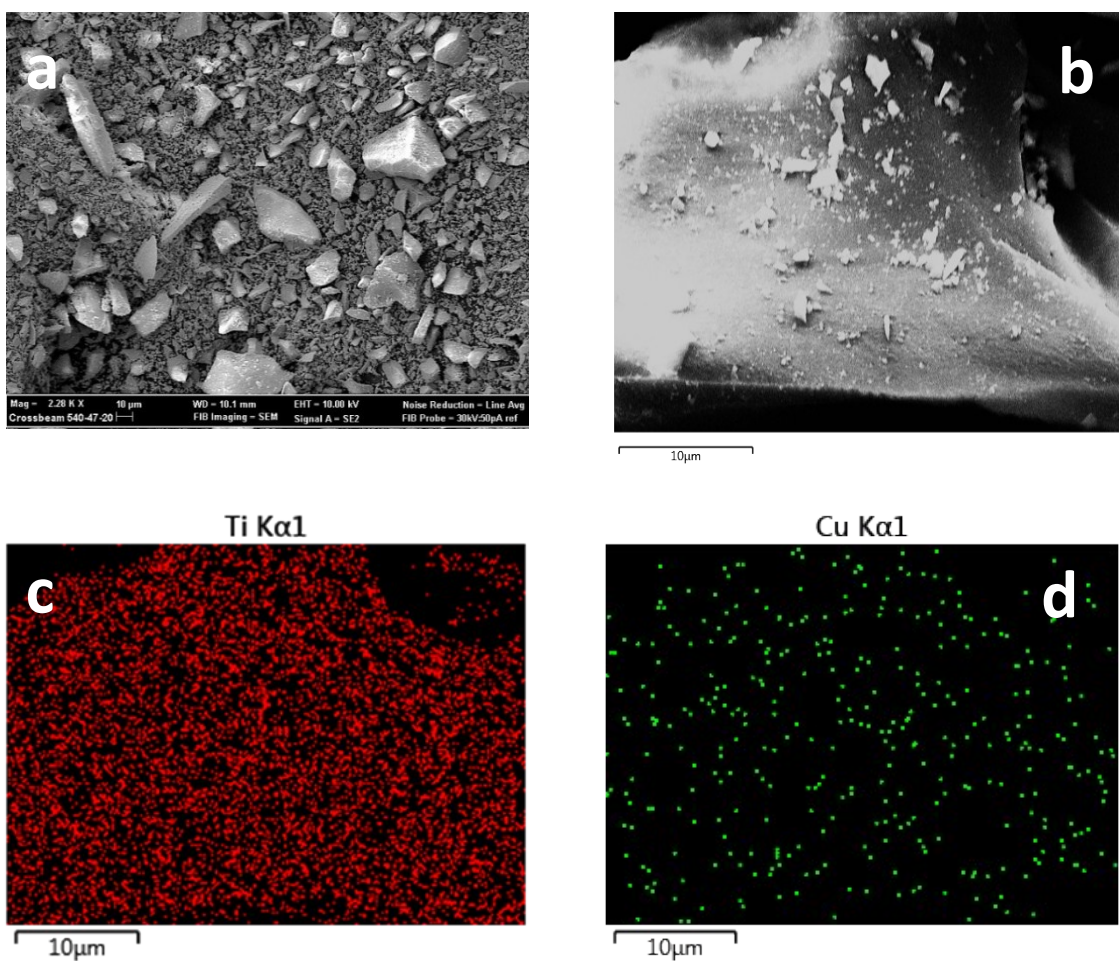


Figure S1. SEM images of a $\text{Ti}_{1.00}\text{:Cu}_{0.10}$ (a,b), and corresponding EDX maps (c,d).

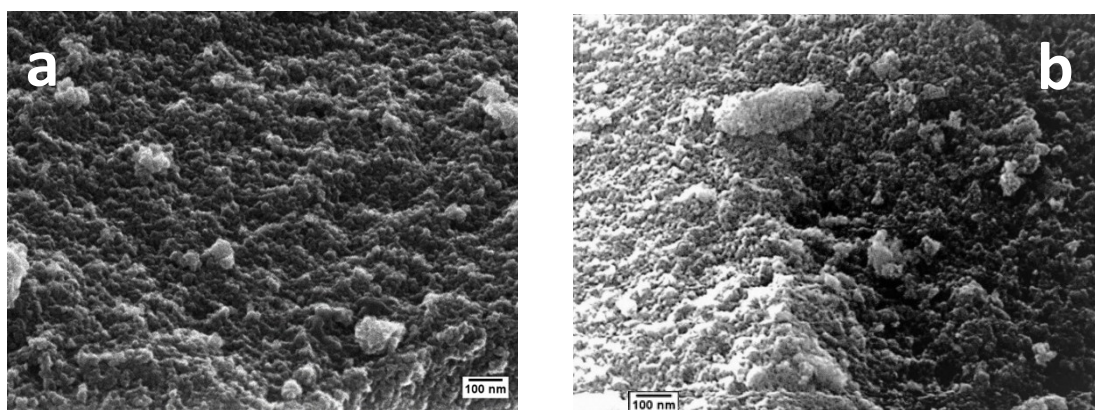


Figure S2. SEM image of: a) pure TiO_2 sample; b) Cu-TiO_2 sample.

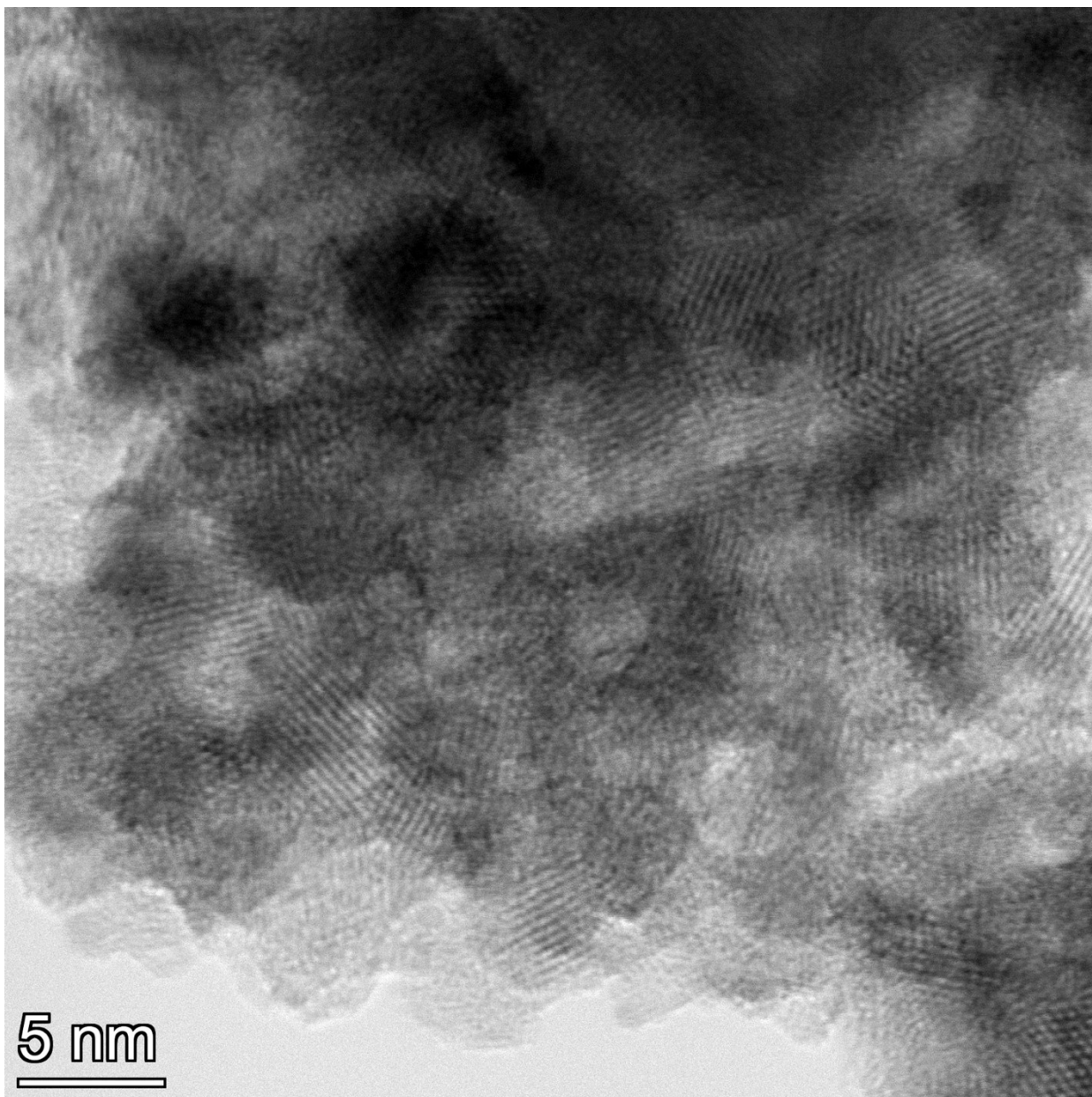


Figure S3. STEM-BF micrograph of **Ti1.00:Cu0.25**.

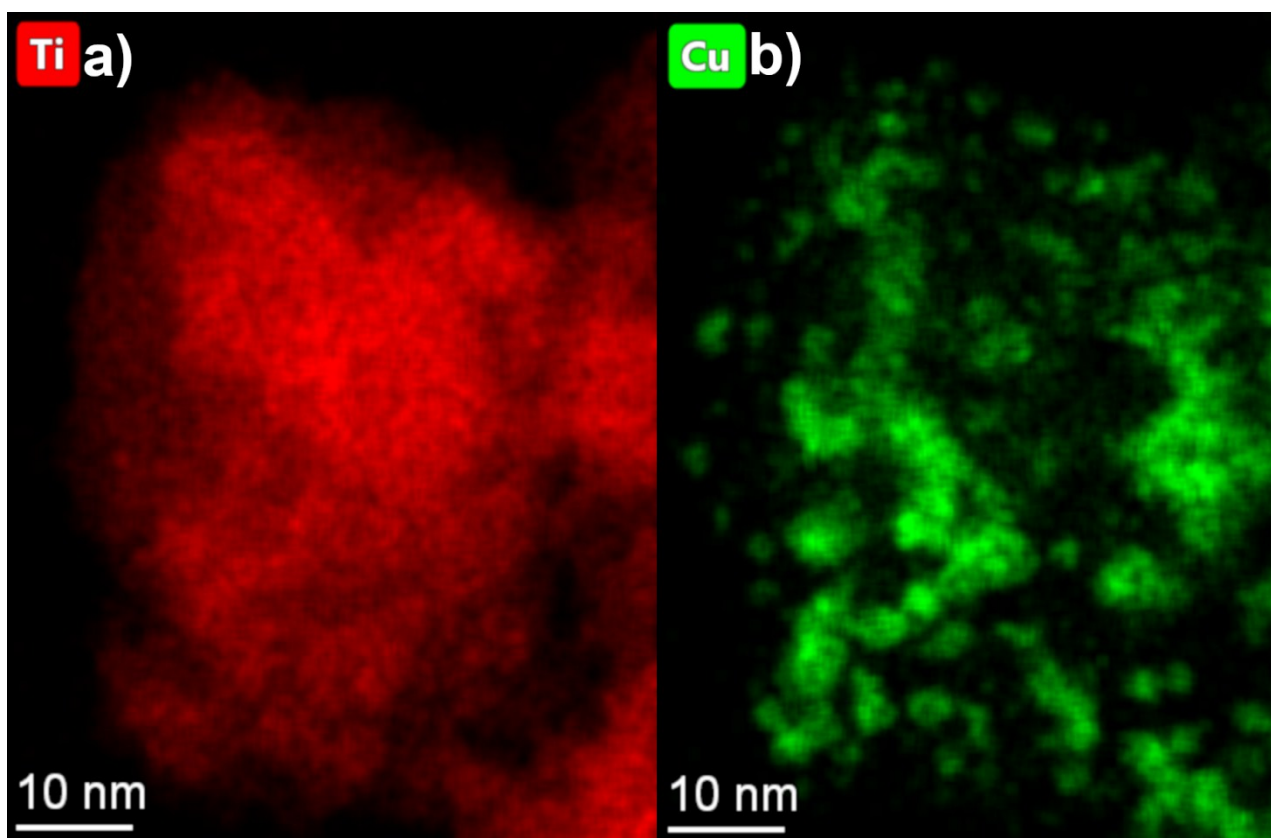


Figure S4. STEM EDS analyses of **Ti_{1.00}:Cu_{0.25}** a) EDS individual chemical map of Ti; b) EDS individual chemical map of Cu.

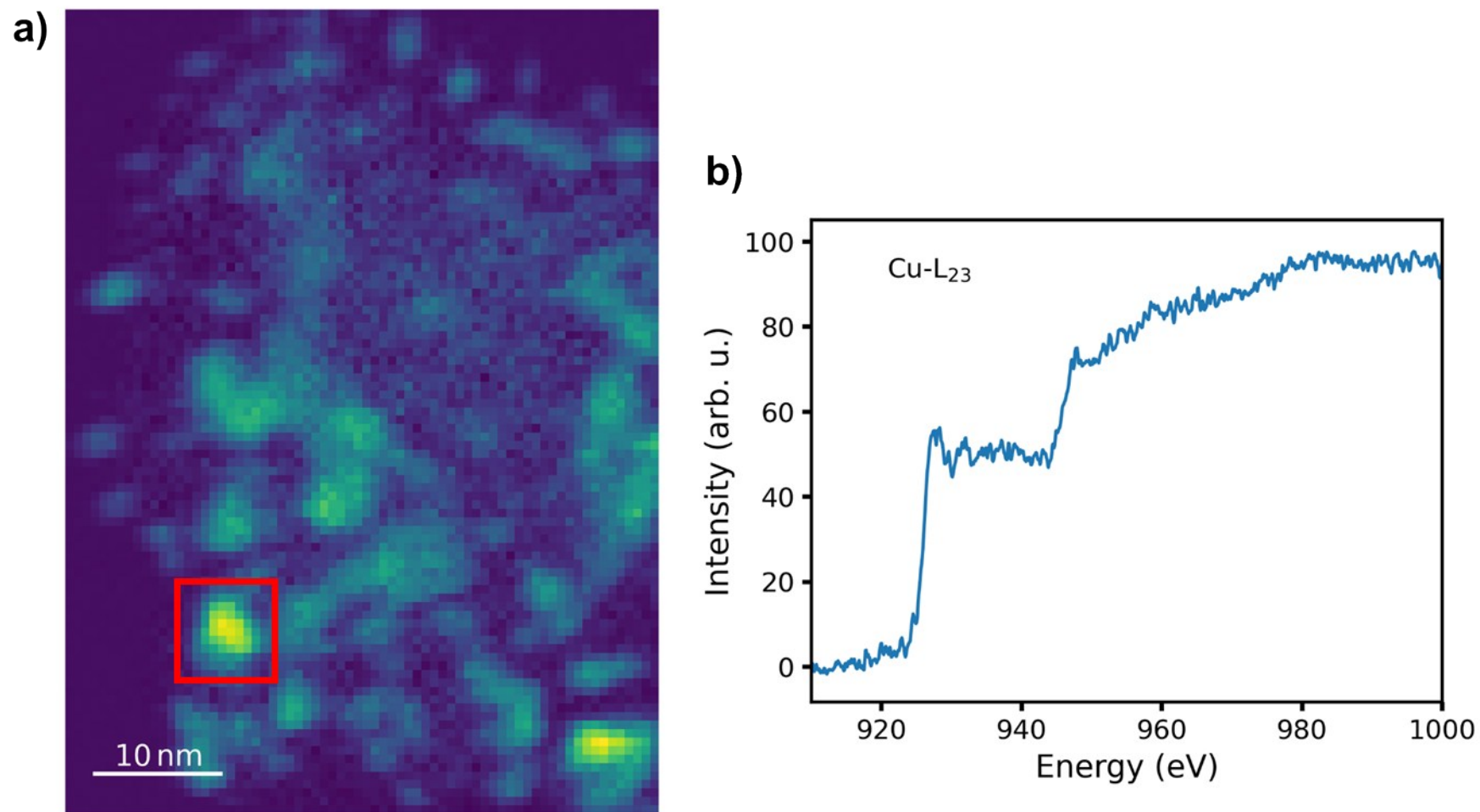


Figure S5. SR-EELS analysis of **Ti1.00:Cu0.25**. a) Cu- $L_{2,3}$ edge integrated intensity EELS map. The red square highlights the area used to extract the corresponding EELS spectrum; b) EELS spectrum showing the Cu- $L_{2,3}$ fine structures.

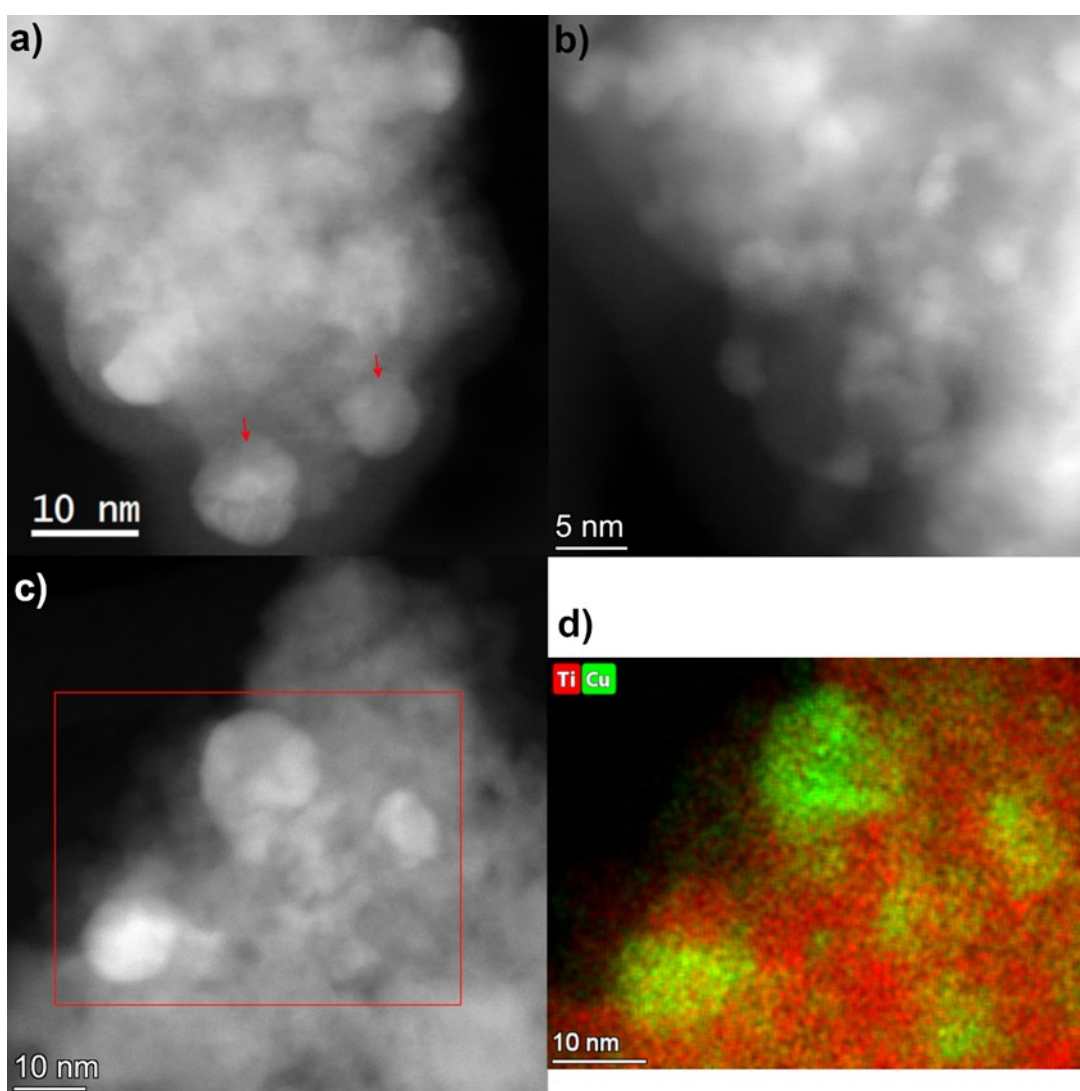


Figure S6. STEM analyses of **Ti_{1.00}:Cu_{0.50}**. a) STEM-HAADF micrograph. The red arrows highlight the presence of bigger Cu-based NPs with a size of about 10 nm; b) STEM-HAADF micrograph of another area of the specimen showing small Cu-based NPs with a size below 2nm; c) STEM-HAADF micrograph. The red square highlights the area used for the EDS analysis; d) Corresponding EDS chemical maps.

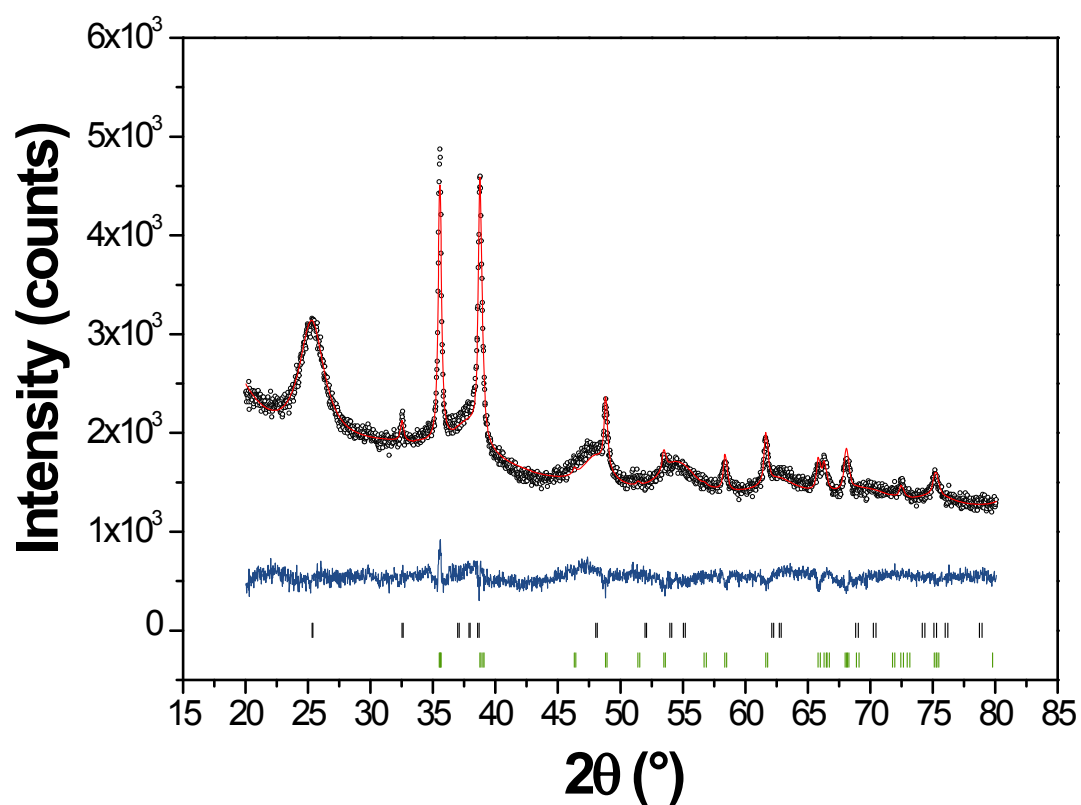


Figure S7. Graphical output of the Rietveld QPA refinement, specimen: **Ti1.00:Cu0.75**. The red continuous line represents the calculated pattern, the black open circles represent the observed pattern, and the difference curve between observed and calculated profiles is plotted below. The position of reflections is indicated by the small vertical bars (black: anatase; green: tenorite).

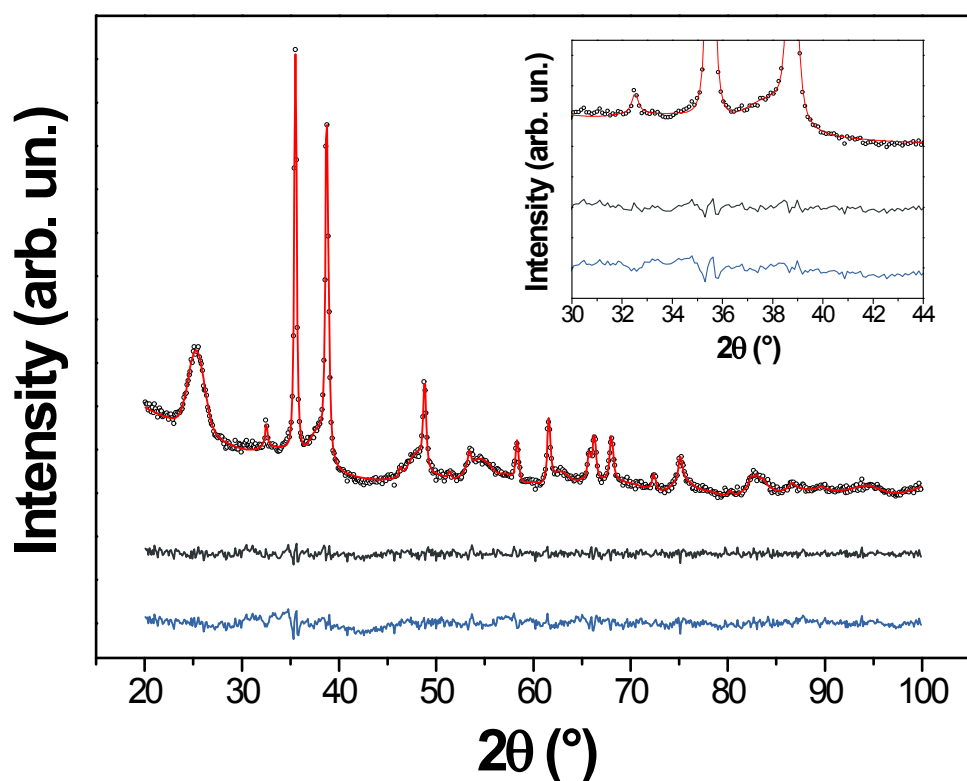


Figure S8. Graphical output of the WPPM modelling, specimen **Ti1.00:Cu1.00**. The red line represents the calculated pattern and the black open circles the measured one. The dark grey (upper) and blue (lower) continuous lines at the bottom are the difference curves between observed and calculated profiles, for the proposed bimodal and unimodal size distribution models, respectively. A magnification in the 30-44 °2θ range is shown in the inset, in order to highlight the difference in the most intense reflections of tenorite – (111) and ($\bar{1}11$), at 38.79 and 35.59 °2θ, respectively.

Table S1 – WPPM agreement factors and average domain diameter of the two fractions of tenorite according to the proposed bimodal size distribution model.

Sample	Agreement factors			Mean crystalline domain diameter (nm)	
	R_{wp} (%)	R_{exp} (%)	χ^2	$\langle D_{tnr_0} \rangle$	$\langle D_{tnr_1} \rangle$
50D	1.72	1.86	0.93	15.9±1.0	2.0±1.3
54B	1.48	1.22	1.21	34.1±1.0	2.8±1.2
54C	1.75	1.14	1.53	36.8±5.1	1.3±0.7
54D	1.79	1.05	1.71	47.8±5.4	1.7±0.5

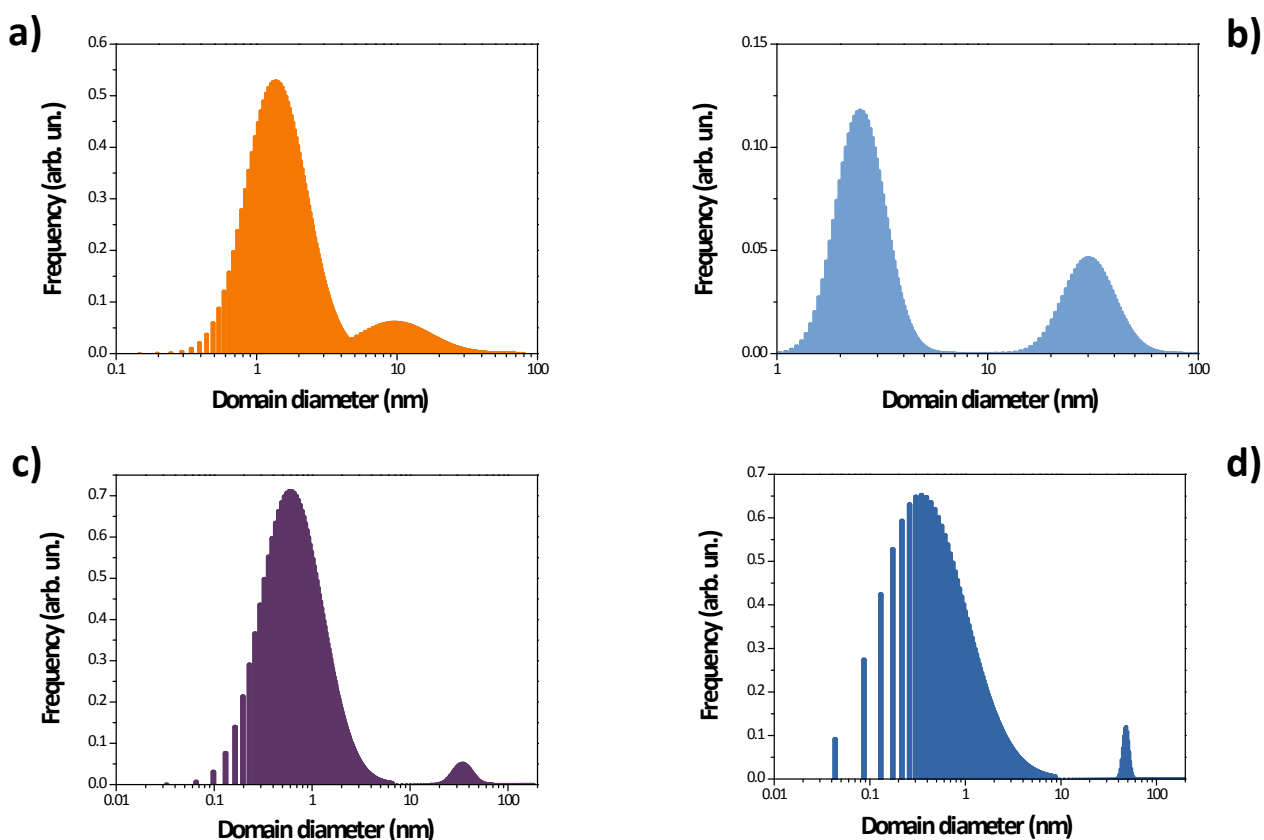


Figure S9. Bimodal size distribution for tenorite in: a) **Ti1.00:Cu1.00**; b) **Ti0.75:Cu1.00**; c) **Ti0.50:Cu1.00**; d) **Ti0.25:Cu1.00**. Size is reported in log-scale in all of the figures.

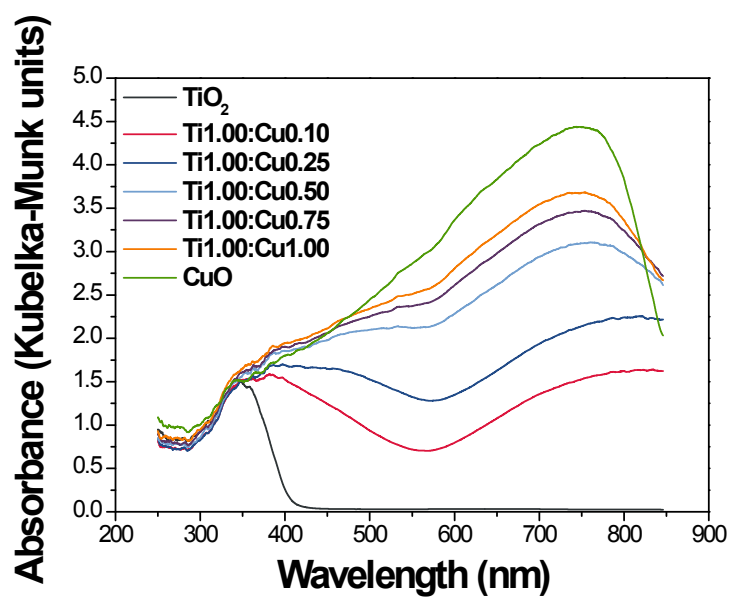


Figure S10. DR spectra for selected specimens.