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Supplementary Information

Controllable Synthesis and Evolution Mechanism of Tungsten Bronze Nanocrystals with Excellent Optical Performance for Energy-Saving Glasses

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Table S1. The concentration of cesium and sodium precursors mixed with AMT

Cesium and sodium precursors	Concentration (mmol)	Mol ratio to W
Na_2SO_4/ Cs_2SO_4	0.066/ 0.132	0.11/ 0.22
NaCl/ CsCl	0.132/ 0.264	0.11/ 0.22
NaAc/ CsAc	0.132/ 0.264	0.11/ 0.22
NaOH/ $CsOH \cdot H_2O$	0.132/ 0.264	0.11/ 0.22

Table S2. Compositions of tungsten bronze nanoparticles estimated by an X-ray photoelectron spectroscopy and the simulated amount of metal doping.

Sample	Atomic ratio					(Na+Cs)/W mol ratio	
	W4f	C1s	O1s	Cs3d	Na1s	Experimental	Simulated
NaCWO-S	4.93	75.59	18.31	0.86	0.31	0.2373	0.239
NaCWO-C	4.68	77.79	16.25	1.1	0.18	0.2735	0.272
NaCWO-A	5.29	76.05	17.2	0.94	0.52	0.2760	0.277
NaCWO-O	5.27	73.43	19.66	1	0.64	0.3112	0.310

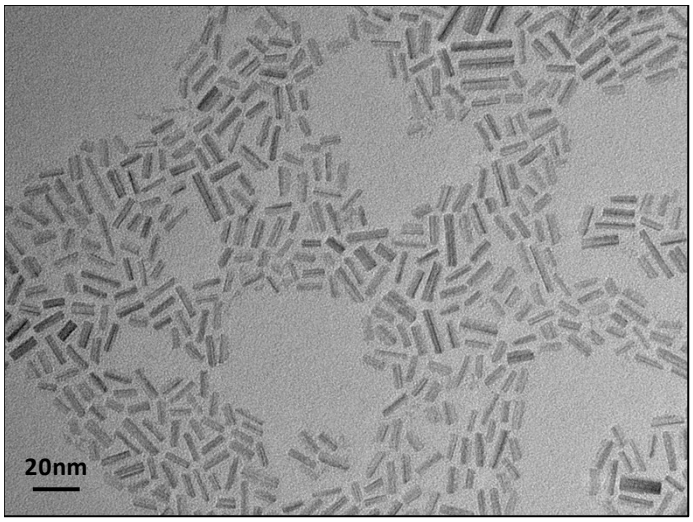

Fig. S1 TEM image of NaCWO-S nanocrystals reacting for 20 h.

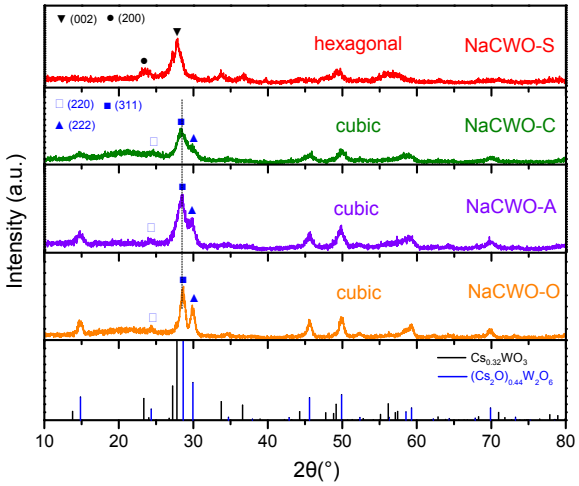

Fig. S2 XRD of various NaCWO nanocrystals prepared with increased ionic amount (M/W=0.5 mol ratio).

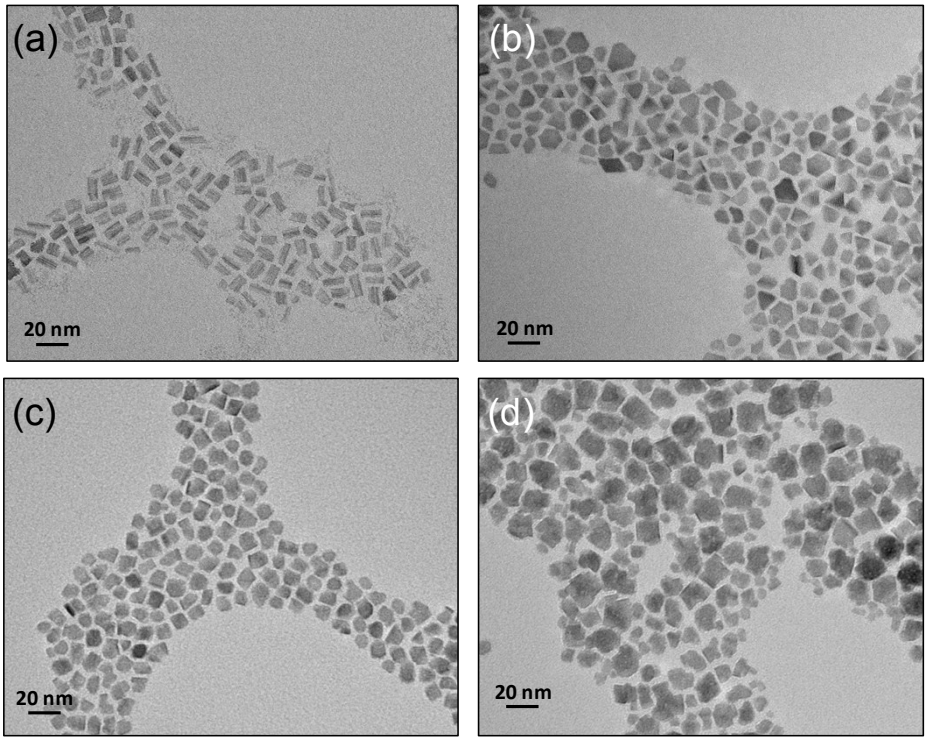

Fig. S3 TEM images of the NaCWO nanocrystals prepared with increased ionic amount (M/W = 0.5, mol ratio) at different ligand environments: (a) SO_4^{2-}; (b) Cl^-; (c) Ac^-; (d) OH^-.

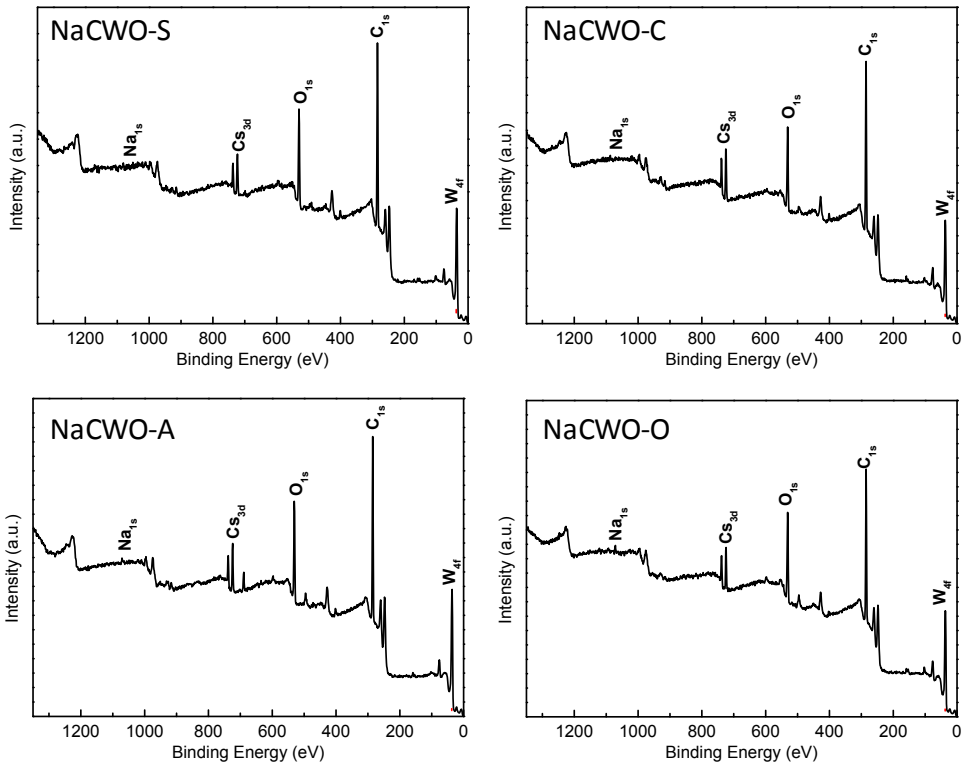

Fig. S4. Full range XPS spectra of various NaCWO nanocrystals.

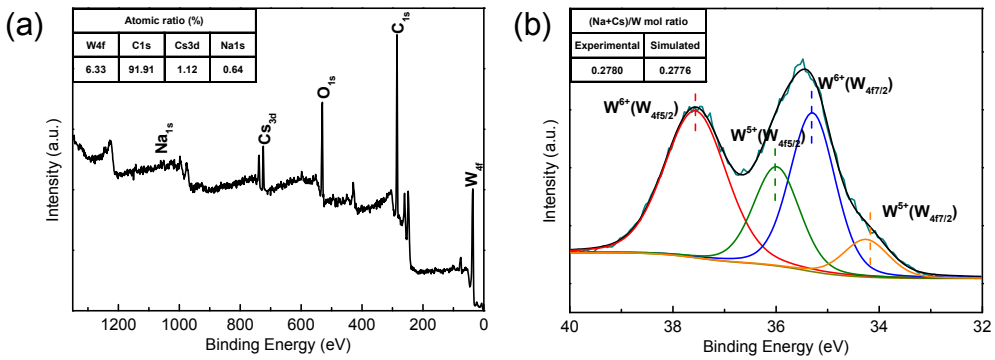

Fig. S5. Full range XPS spectra (a) and fitted XPS spectra on W4f core level (b) of NaCWO-S nanocrystals reacting for 20 h.

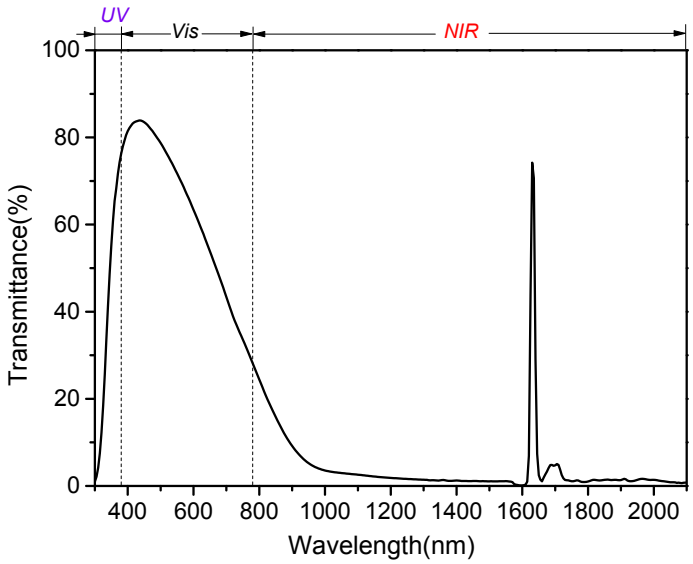

Fig. S6. Transmittance spectra of NaCWO-S nanocrystals reacting for 20 h.