Electronic Supporting Information

Low-Temperature Synthesis of Homogeneous Solid Solutions of Scheelite-Structured $Ca_{1-x}Sr_xWO_4$ and $Sr_{1-x}Ba_xWO_4$ Nanocrystals

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Figures and Tables

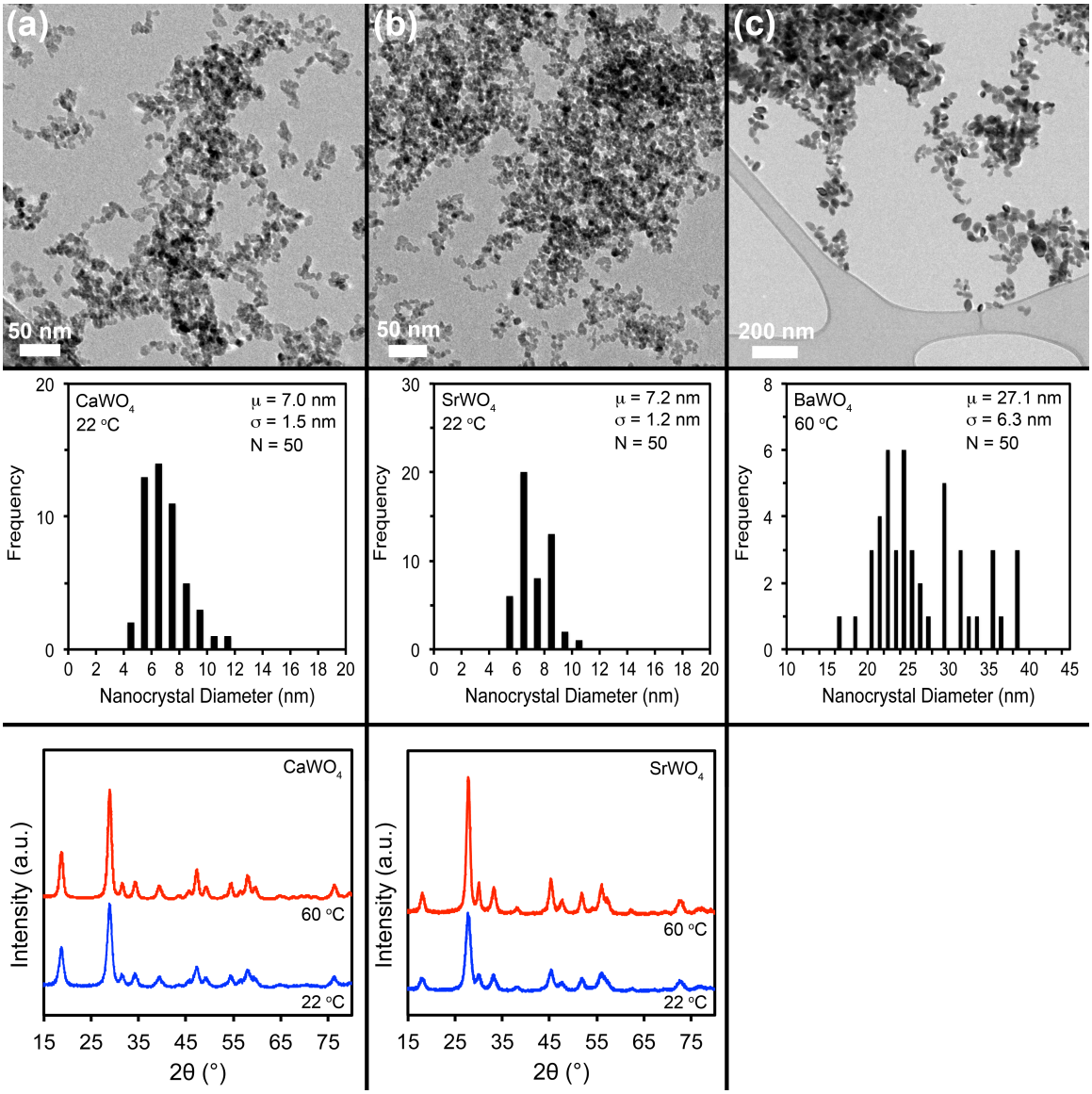

Fig. S1 TEM images of (a) $CaWO_4$ and (b) $SrWO_4$ products aged at 22 °C under nitrogen for 24 h and (c) $BaWO_4$ aged at 60 °C under nitrogen for 24 h with associated nanocrystal size distribution histrograms. Diffractograms illustrating the effects of thermal aging are also provided for $CaWO_4$ and $SrWO_4$.

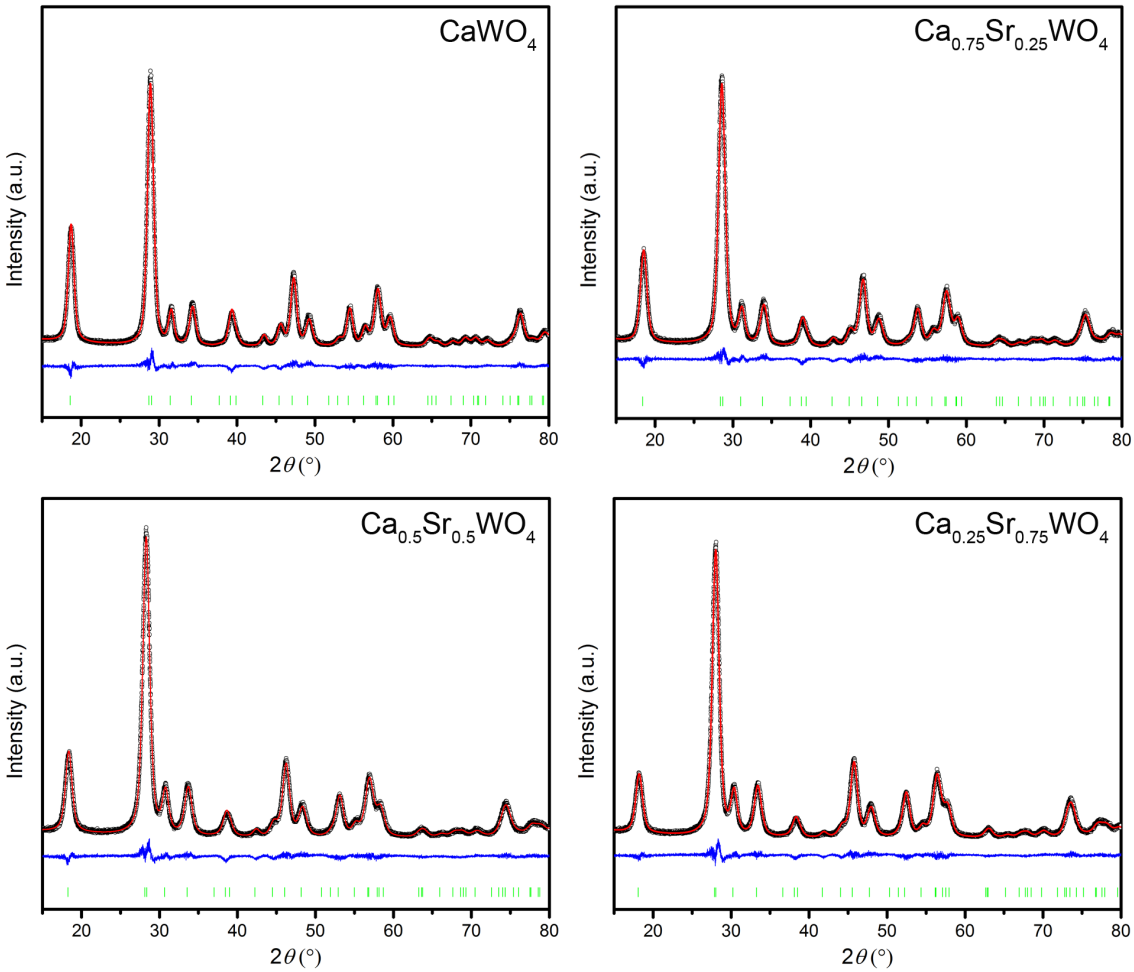

Fig. S2 Rietveld analysis of XRD patterns for $A_{1-x}A'_xWO_4$ nanocrystal solid solutions. Experimental (O) and calculated (—) patterns are shown for each sample along with the difference curve (—) and tickmarks (|) corresponding to the phase refined. The nominal composition of each phase is indicated in the top right of each pattern. —*Continues on the following page*.

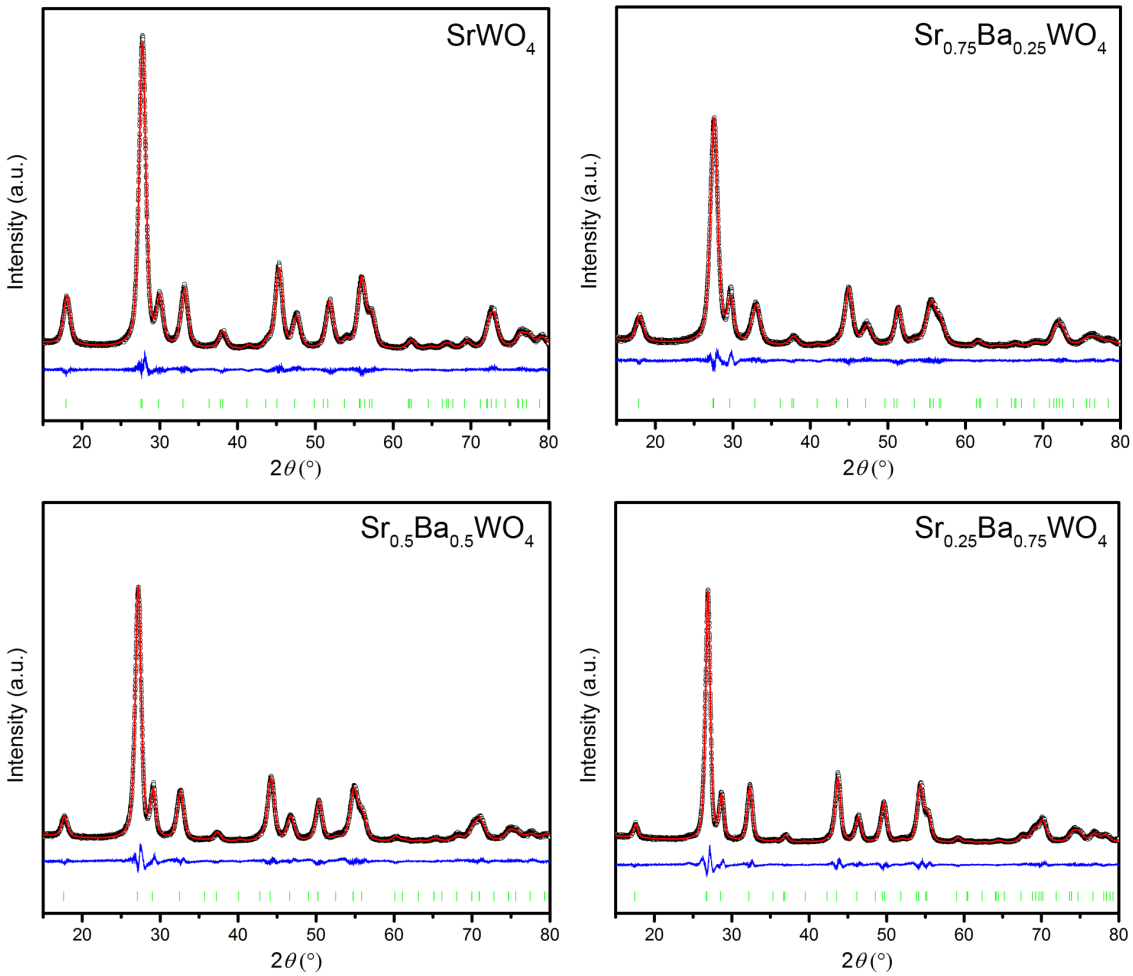

Fig. S2 —*Continued from the previous page*. Rietveld analysis of XRD patterns for $A_{1-x}A'_xWO_4$ nanocrystal solid solutions. Experimental (O) and calculated (—) patterns are shown for each sample along with the difference curve (—) and tickmarks (|) corresponding to the phase refined. The nominal composition of each phase is indicated in the top right of each pattern. —*Continues on the following page*.

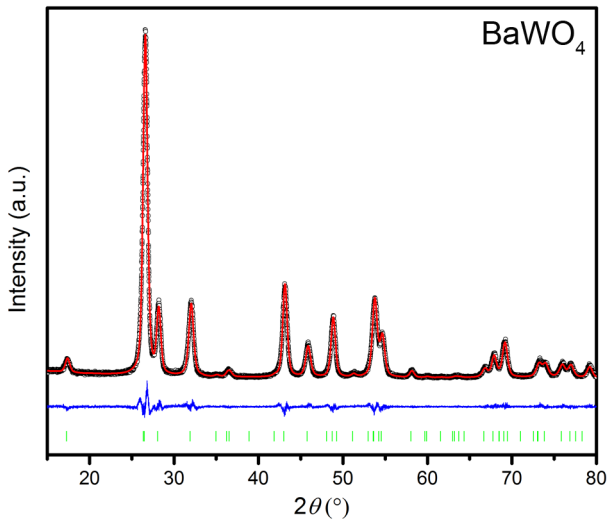

Fig. S2 —*Continued from the previous page*. Rietveld analysis of XRD patterns for $A_{1-x}A'_xWO_4$ nanocrystal solid solutions. Experimental (O) and calculated (—) patterns are shown for each sample along with the difference curve (—) and tickmarks (|) corresponding to the phase refined. The nominal composition of each phase is indicated in the top right of each pattern.

Table S1. Rietveld Analysis of X-ray Diffraction Data for $A_{1-x}A'_xWO_4$ Nanocrystal Solid Solutions

	$Ca_{0.75}Sr_{0.25}WO_4$	$Ca_{0.5}Sr_{0.5}WO_4$	$Ca_{0.25}Sr_{0.75}WO_4$
a (Å)	5.2949(10)	5.3368(10)	5.3850(11)
c (Å)	11.5264(22)	11.6616(22)	11.8208(24)
V (Å^3)	323.16(19)	332.14(19)	342.79(21)
x, y, z O	0.6586(8), 0.4942(5), 0.2106(3)	0.6557(6), 0.4922(4), 0.2096(2)	0.6542(7), 0.4944(5), 0.2090(3)
W–O (Å)	1.8742(27)	1.8858(23)	1.8893(27)
U_A (Å^2)[a]	1.35(3)	1.29(2)	1.29(2)
U_W (Å^2)[a]	1.08(2)	2.30(2)	1.03(2)
U_O (Å^2)[a]	2.77(16)	2.64(14)	4.69(18)
R_{wp}	6.0	5.4	6.0
χ^2	1.80	1.58	1.82
	$Sr_{0.75}Ba_{0.25}WO_4$	$Sr_{0.5}Ba_{0.5}O_4$	$Sr_{0.25}Ba_{0.75}WO_4$
a (Å)	5.4500(16)	5.5065(16)	5.5560(14)
c (Å)	12.0684(35)	12.3063(37)	12.5046(31)
V (Å^3)	358.47(31)	373.15(34)	386.00(29)
x, y, z O	0.6494(11), 0.4929(7), 0.2046(3)	0.6459(10), 0.4971(8), 0.2090(4)	0.6336(9), 0.4932(9), 0.2092(4)
W–O (Å)	1.8840(40)	1.9110(40)	1.9220(40)
U_A (Å^2)[a]	2.17(3)	1.36(3)	0.52(3)
U_W (Å^2)[a]	1.73(2)	1.09(2)	0.72(2)
U_O (Å^2)[a]	7.36(28)	6.97(31)	4.51(28)
R_{wp}	5.8	7.3	8.2
χ^2	1.56	2.13	2.17

[a] Given as $100\times U$

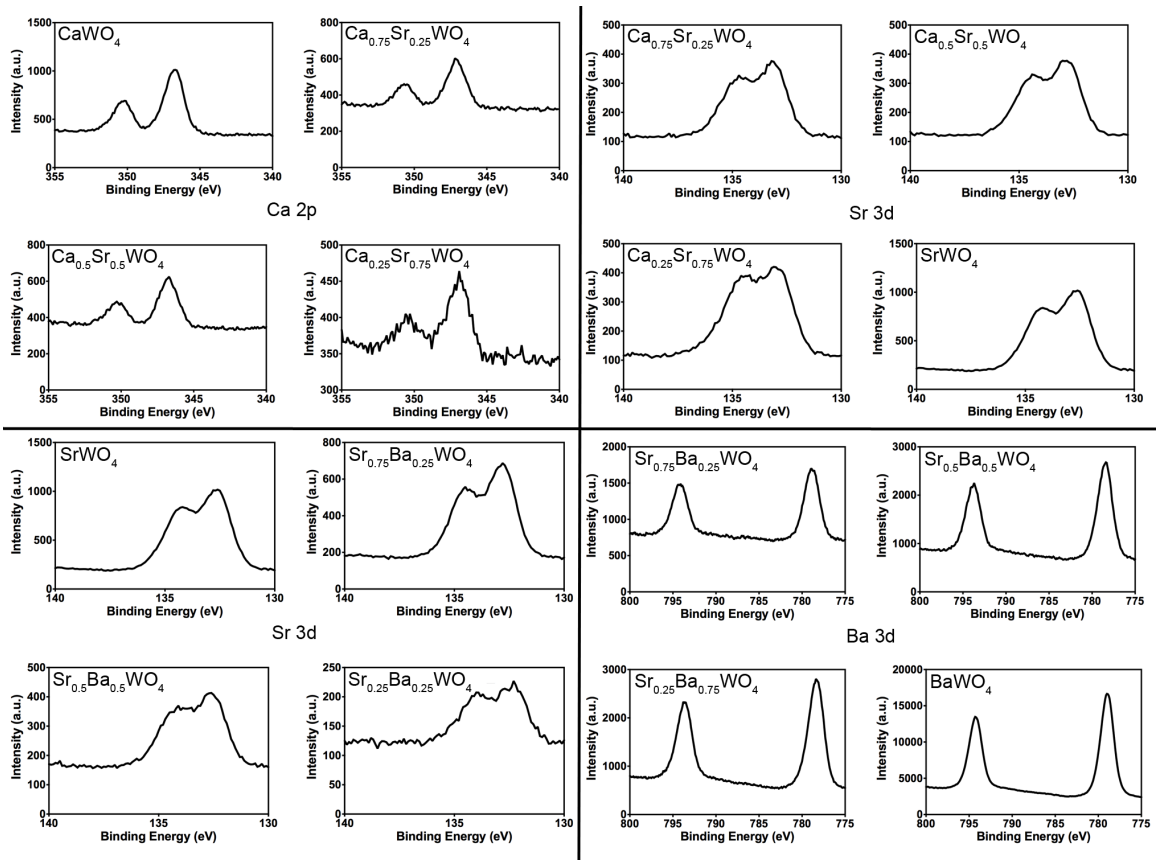

Fig. S3 XPS spectra illustrating relevant states for the A-site atoms in the $A_{1-x}A'_xWO_4$ nanocrystal solid solutions. All doublets can be assigned to divalent alkaline earth atoms.

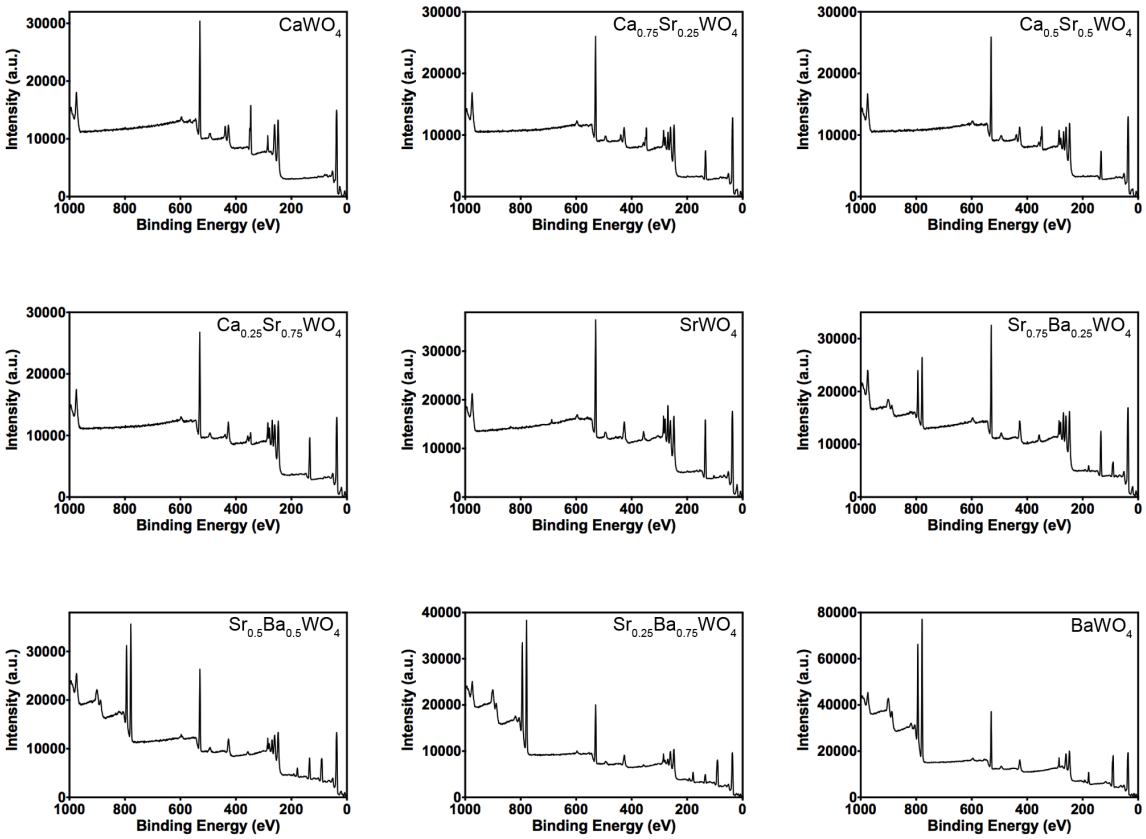

Fig. S4 XPS survey spectra for the $A_{1-x}A'_xWO_4$ nanocrystal solid solutions.

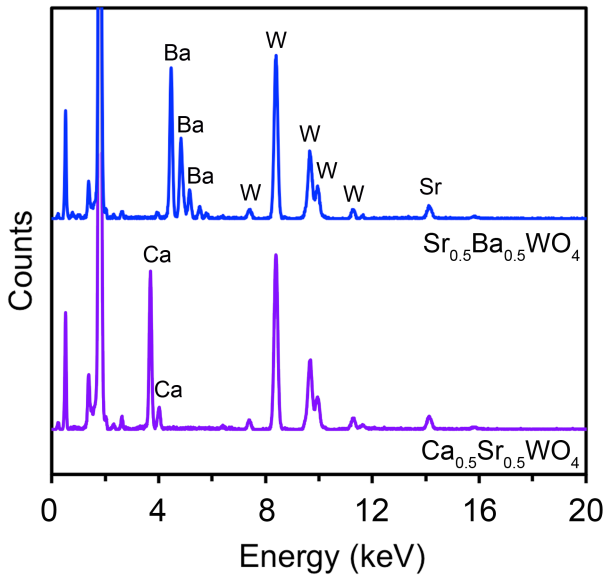

Fig. S5 SEM–EDX spectra for the $Ca_{0.5}Sr_{0.5}WO_4$ and $Sr_{0.5}Ba_{0.5}WO_4$ nanocrystals.

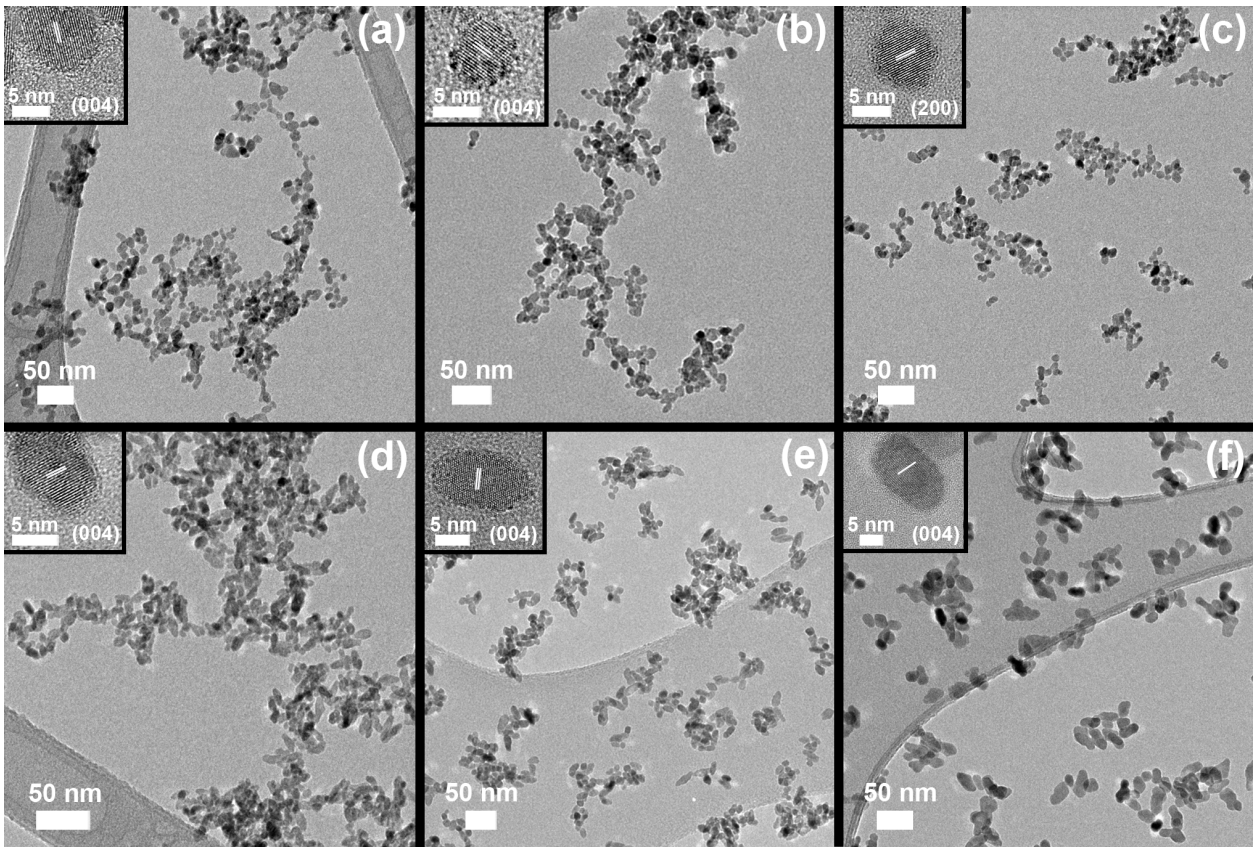

Fig. S6 TEM images of (a) $Ca_{0.75}Sr_{0.25}WO_4$, (b) $Ca_{0.5}Sr_{0.5}WO_4$, (c) $Ca_{0.25}Sr_{0.75}WO_4$, (d) $Sr_{0.25}Ba_{0.75}WO_4$, (e) $Sr_{0.5}Ba_{0.5}WO_4$, and (f) $Sr_{0.25}Ba_{0.75}WO_4$ nanocrystals. High-resolution TEM images for single AWO_4 nanocrystals are provided in the insets.

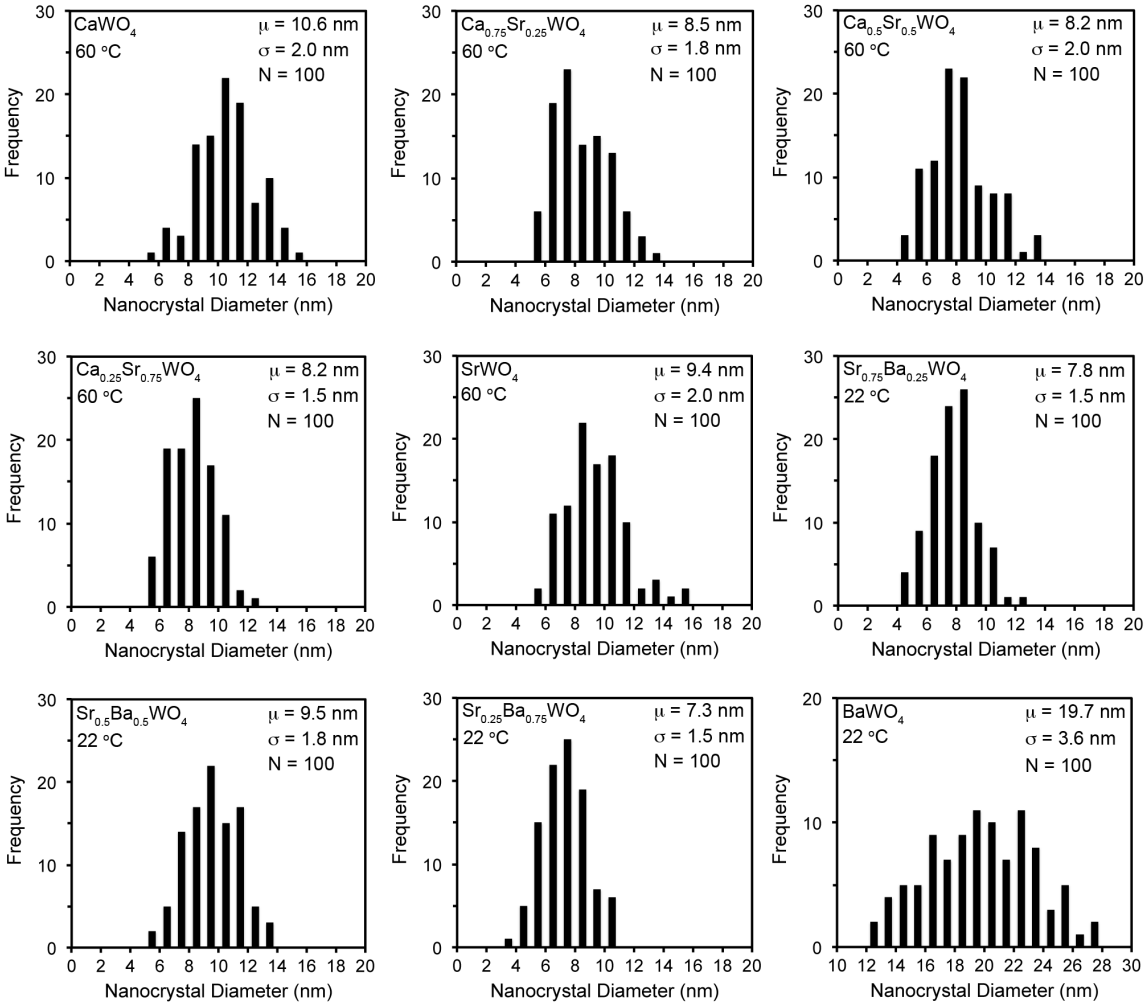

Fig. S7 Nanocrystal size distribution histograms for $A_{1-x}A'_xWO_4$ nanocrystal solid solutions. The total number of nanocrystals counted (N), mean diameter (μ), and standard deviation (σ) are indicated.

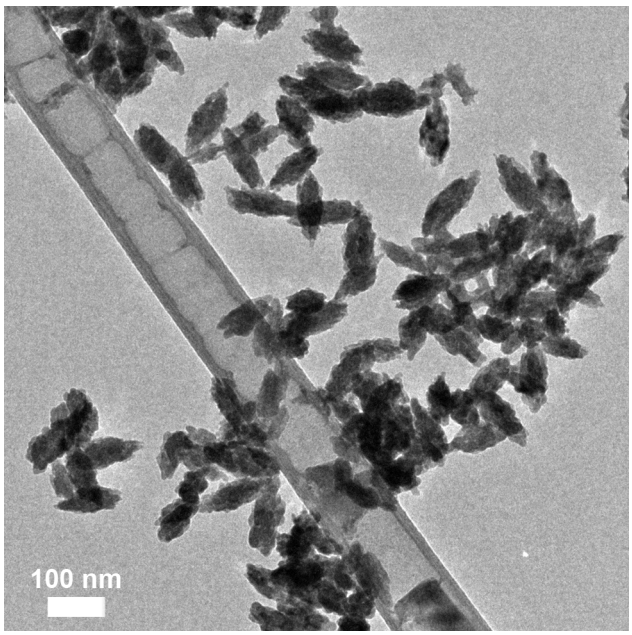

Fig. S8 Representative TEM image of $Sr_{0.75}Ba_{0.25}WO_4$ nanocrystals thermally aged at 100 °C under flowing nitrogen for 24 h.