Electronic Supporting Information

Strong photoluminescence and sensing performance of nanosized $Ca_{0.8}Ln_{0.1}Na_{0.1}WO_4$ (Ln=Sm, Eu) compounds obtained by dry "top-down" grinding method

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Table S1: Main crystallographic parameter of crystalline samples of $CaWO_4$ and Eu and Sm doped phases (**Eu@CWO** and **Sm@CWO**).

	$CaWO_4$	**Eu@CWO**	**Sm@CWO**
a (Å)	5.2387(5)	5.2438(2)	5.2418(3)
c (Å)	11.378(1)	11.3799(5)	11.3817(8)
V (Å^3)	312.25(5)	312.91(2)	312.73(3)
A (8*d*) 0,1/4,5/8			
Occ (Ca/Ln)	1	0.804(8)/0.100(4)	0.81(1)/0.096(5)
B_{iso} (Å)	1.0(3)	1.5(5)	1.5(6)
W (8*c*) 0,1/4,1/8			
Occ	1	1	1
B_{iso} (Å)	0.8(1)	1.1(2)	0.9(2)
O (16*f*) *x*,*y*,*z*			
x	0.748(2)	0.755(3)	0.757(4)
y	0.412(3)	0.404(4)	0.413(5)
z	0.049(1)	0.042(1)	0.042(2)
B_{iso} (Å)	2.5(5)	2.8(7)	3.9(9)
Occ	1	1	1
Reliability Factors			
Rp, Rwp, χ^2, R_{Bragg}	10%, 15%, 5.6, 4.2%	12%, 19%, 1.4, 3.5%	16%, 24%, 1.6, 4.4%

Table S2: Cell and microstructural parameters of milled samples of **Eu@CWO** and **Sm@CWO**

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	Eu@CWO	**Sm@CWO**
Cell parameters		
a (Å)	5.2455(9)	5.248(1)
c (Å)	11.373(2)	11.383(3)
V (Å^3)	312.9(1)	313.1(1)
Microstructural parameters		
Apparent size	17.51 nm	18.87 nm
Apparent strain	1.12 %	1.71 %
Reliability Factors		
Rp, Rwp, χ^2, R_{Bragg}	14%, 18%, 1.1, 5.7%	14%, 19%, 1.1, 5.7%

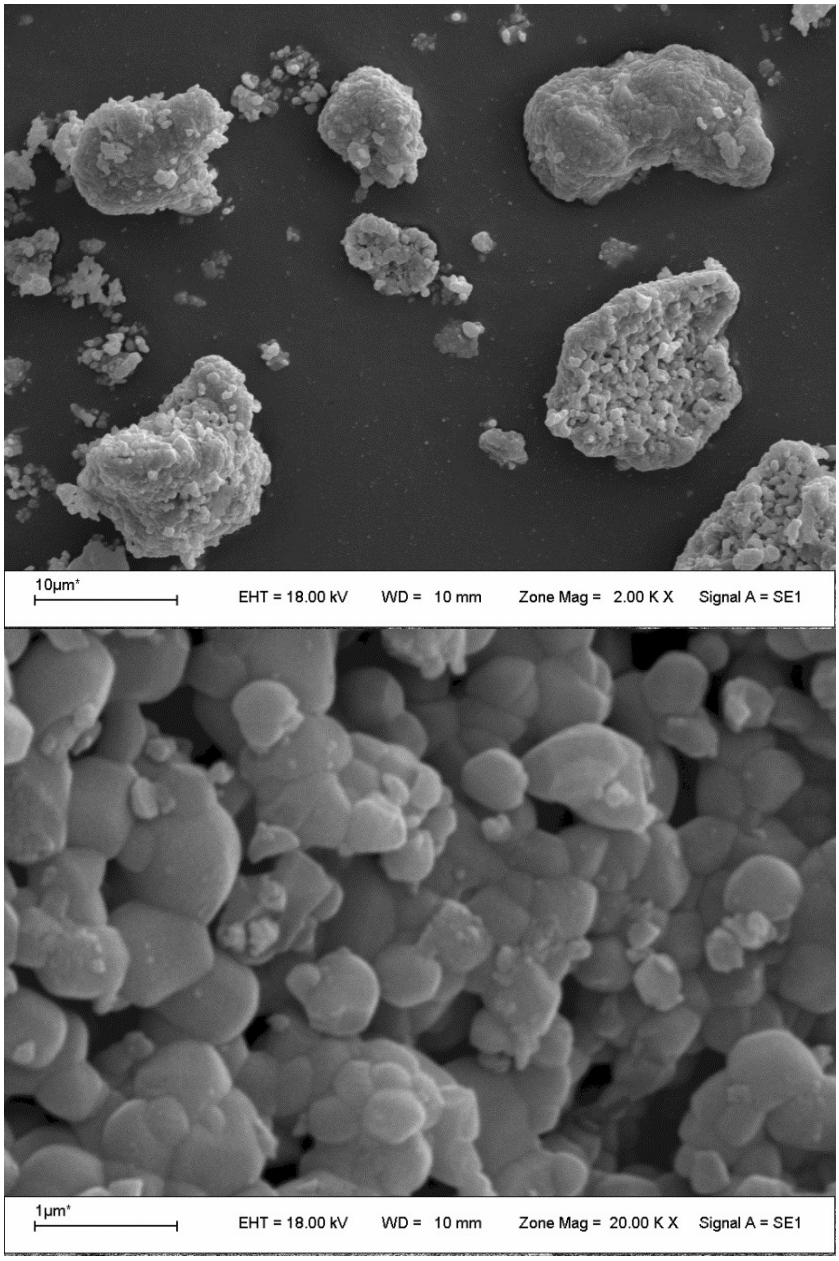

Figure S1: SEM micrographs of **CWO**.

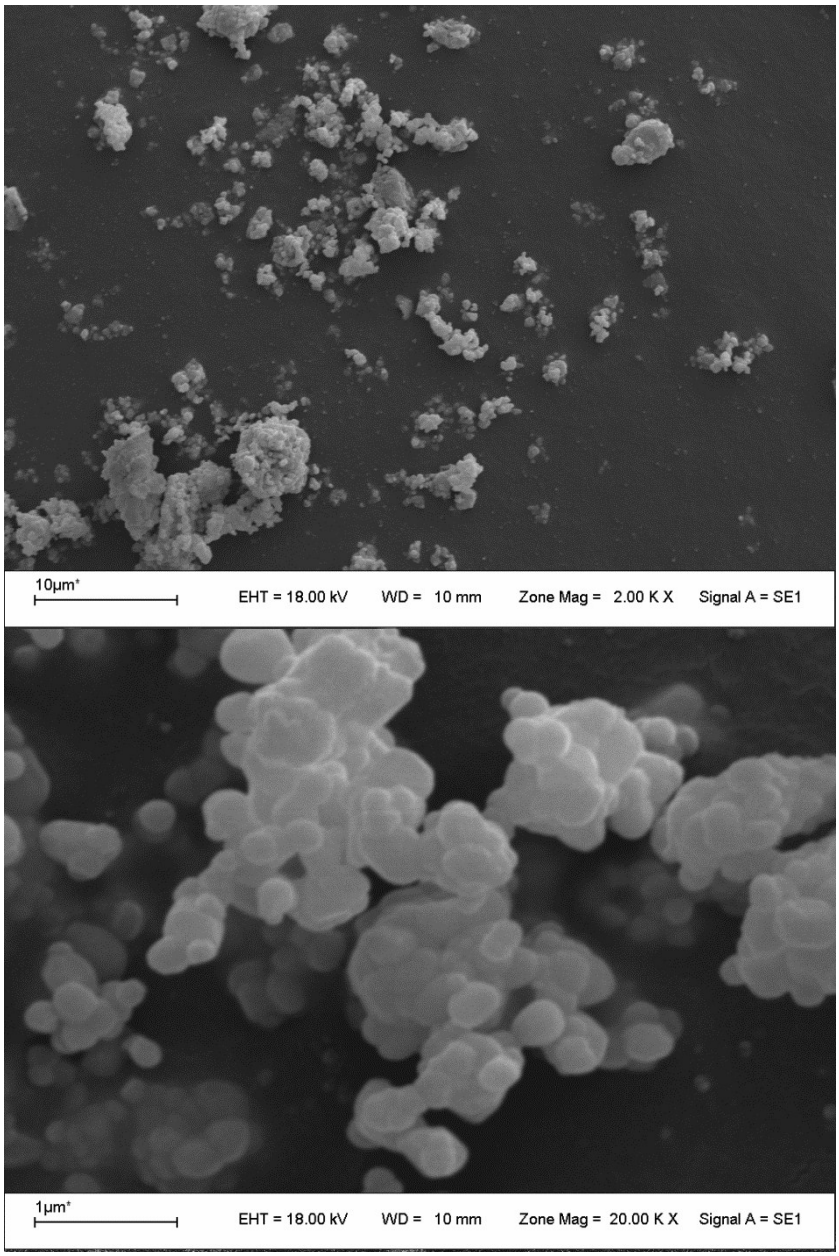

Figure S2: SEM micrographs of **Eu@CWO** before milling miniaturization.

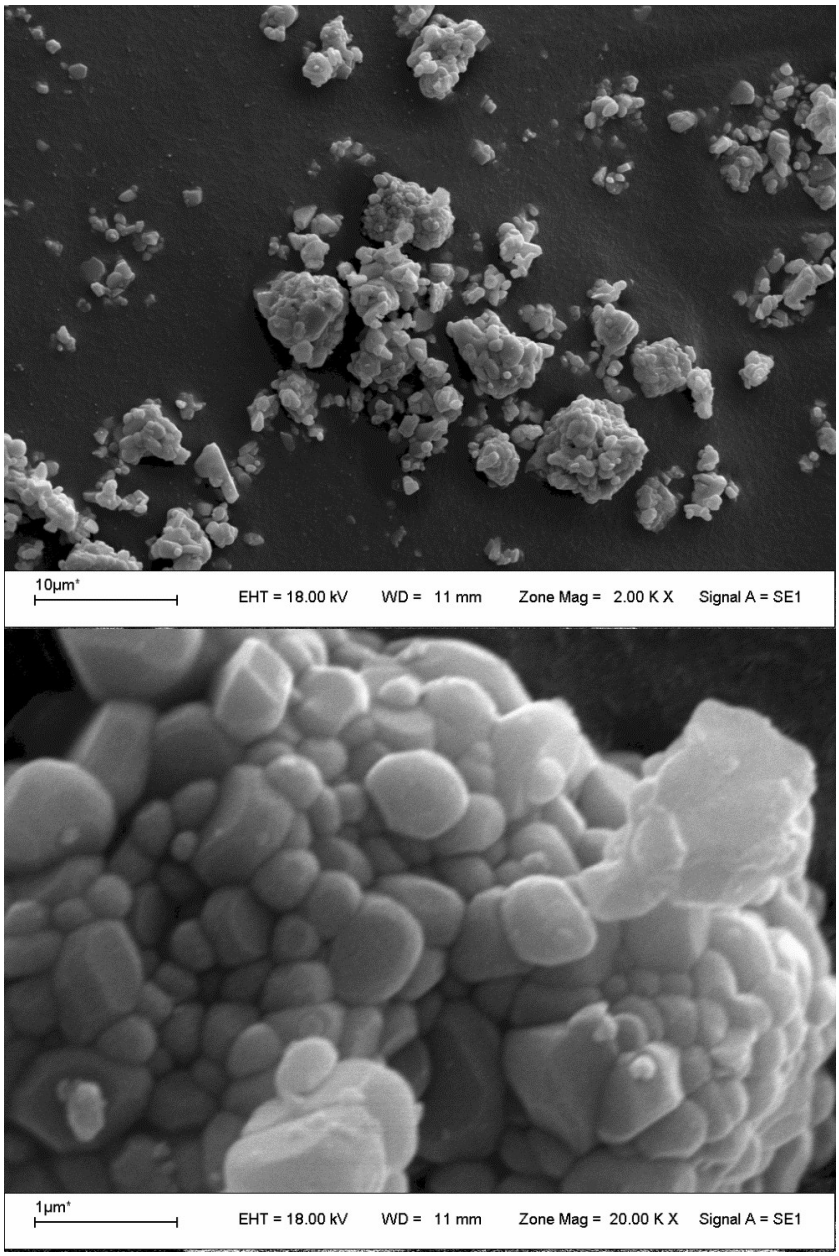

Figure S3: SEM micrographs of **Sm@CWO** before milling miniaturization.

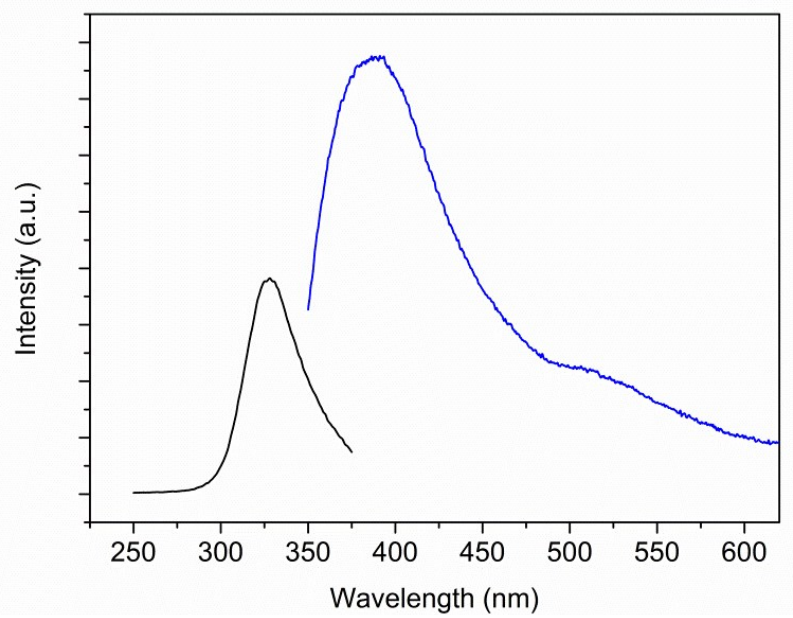

Figure S4: Excitation (black trace) and emission (blue trace) spectra of **CWO**.

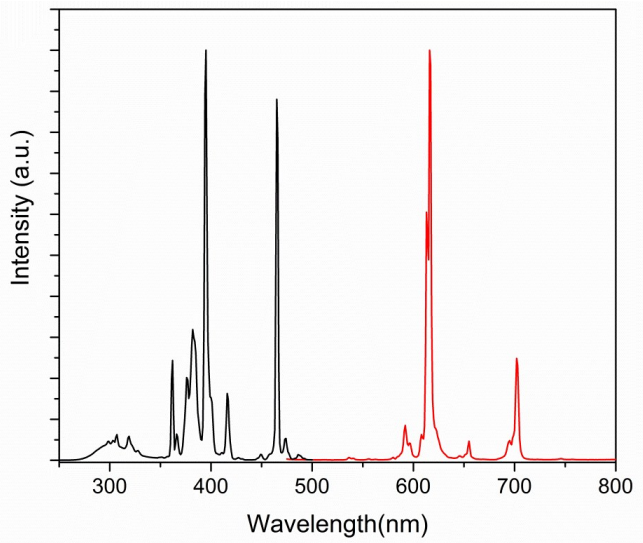

Figure S5: Excitation (λ_{em}=616 nm) (black) and emission (red) (λ_{ex}=465 nm) spectra of **Eu@CWO**.

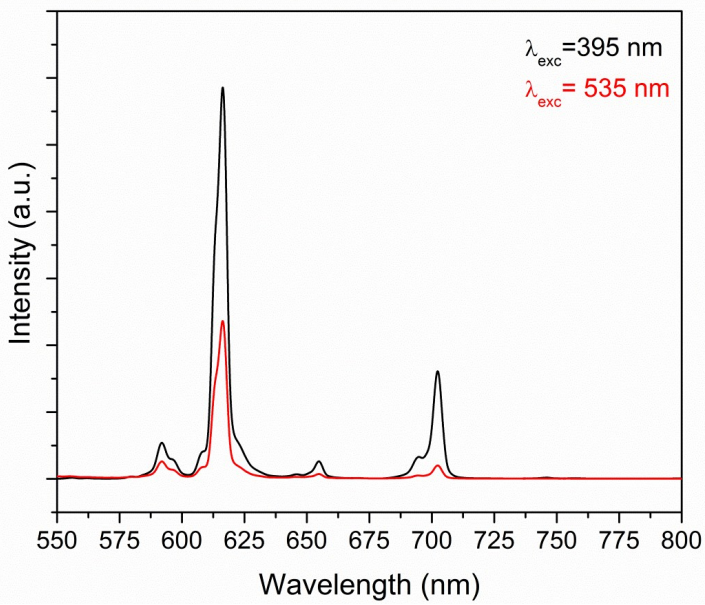

Figure S6: Emission spectra of **Eu@CWO** at λ_{ex}=395 and 535 nm.

Table S3. Assignment of the 4*f*-4*f* transitions in the excitation and emission spectra of **Eu@CWO** and **Sm@CWO** nanoparticles.

Eu@CWO							
Excitation λ_{exc}=395 nm				Emission			
Label	λ (nm)	Energy (cm^{-1})	Transition	Label	λ (nm)	Energy (cm^{-1})	Transition
a	260-330	39063-30303	CTB				
b	299	33445	$^5I_5$, $^5H_5$←$^7F_1$/ $^5F_5$←$^7F_0$	A	418	23923	$^5D_3$→$^7F_1$
c	304	32895	$^5F_1$←$^7F_1$/ $^5F_2$←$^7F_0$	B	432	23148	$^5D_3$→$^7F_2$
d	319	31348	$^5H_6$←$^7F_0$	C	446	22422	$^5D_3$→$^7F_3$
e	328	30488	$^5H_7$←$^7F_1$	D	466	21459	$^5D_2$→$^7F_0$
f	362	27624	$^5D_4$←$^7F_0$	E	470	21277	$^5D_2$→$^7F_1$
g	376	26596	$^5G_6$←$^7F_0$	F	488	20492	$^5D_2$→$^7F_2$
h	383	26110	$^5G_6$, $^5G_5$, $^5G_3$←$^7F_1$	G	511	19569	$^5D_2$→$^7F_3$
i	395	25316	$^5L_6$←$^7F_1$	H	527	18975	$^5D_1$→$^7F_0$
j	416	24038	$^5D_3$←$^7F_1$	I	537	18622	$^5D_1$→$^7F_1$
k	449	22272	$^5D_2$←$^7F_0$	J	556	17986	$^5D_1$→$^7F_2$
l	465	21505	$^5D_2$←$^7F_0$	K	580	17241	$^5D_0$→$^7F_0$
m	473	21142	$^5D_2$←$^7F_1$	L	592	16892	$^5D_0$→$^7F_1$
n	527	18975	$^5D_1$←$^7F_0$	M	616	16234	$^5D_0$→$^7F_2$
o	536	18657	$^5D_1$←$^7F_0$	N	655	15267	$^5D_0$→$^7F_3$
p	554	18051	$^5D_1$←$^7F_0$	O	702	14245	$^5D_0$→$^7F_4$
q	579	17271	$^5D_0$←$^7F_0$	P	746	13405	$^5D_0$→$^7F_5$
r	591	16920	$^5D_0$←$^7F_1$	Q	792	12626	$^5D_0$→$^7F_6$
Sm@CWO							
Excitation				Emission			
Label	λ (nm)	Energy (cm^{-1})	Transition	Label	λ (nm)	Energy (cm^{-1})	Transition
a	260-330	39063-30303	CTB				
b	306	32680	$^4P_{5/2}$←$^4H_{15/2}$	A	564	17730	$^4G_{5/2}$→$^6H_{5/2}$
c	318	31447	$^4P_{3/2}$←$^4H_{15/2}$	B	608	16447	$^4G_{5/2}$→$^6H_{7/2}$
d	333	30030	$^4G_{9/2}$←$^4H_{15/2}$	C	646	15480	$^4G_{5/2}$→$^6H_{9/2}$
e	346	28902	$^4D_{7/2}$←$^4H_{15/2}$	D	706	14164	$^4G_{5/2}$→$^6H_{11/2}$
f	363	27548	$^4D_{5/2}$, $^6P_{5/2}$←$^4H_{15/2}$				
g	377	26525	$^6P_{7/2}$←$^4H_{15/2}$				
h	392	25510	$^4L_{15/2}$←$^4H_{15/2}$				
i	405	24691	$^6P_{3/2}$←$^4H_{15/2}$				

j	420	23810	$^6P_{5/2}$, $^4P_{5/2}$←$^4H_{15/2}$
k	440	22727	$^4G_{9/2}$, $^4M_{17/2}$←$^4H_{15/2}$
l	452	22124	$^4I_{13/2}$, $^4I_{11/2}$←$^4H_{15/2}$
m	464	21552	$^4I_{13/2}$, $^4I_{11/2}$←$^4H_{15/2}$
n	470	21277	$^4I_{13/2}$, $^4I_{11/2}$←$^4H_{15/2}$
o	482	20747	$^4I_{13/2}$, $^4I_{11/2}$←$^4H_{15/2}$
p	490	20408	$^4I_{13/2}$, $^4I_{11/2}$←$^4H_{15/2}$
q	500	20000	$^4G_{5/2}$←$^4H_{15/2}$
r	530	18868	$^4F_{3/2}$←$^4H_{15/2}$
s	562	17794	$^4F_{3/2}$←$^4H_{15/2}$

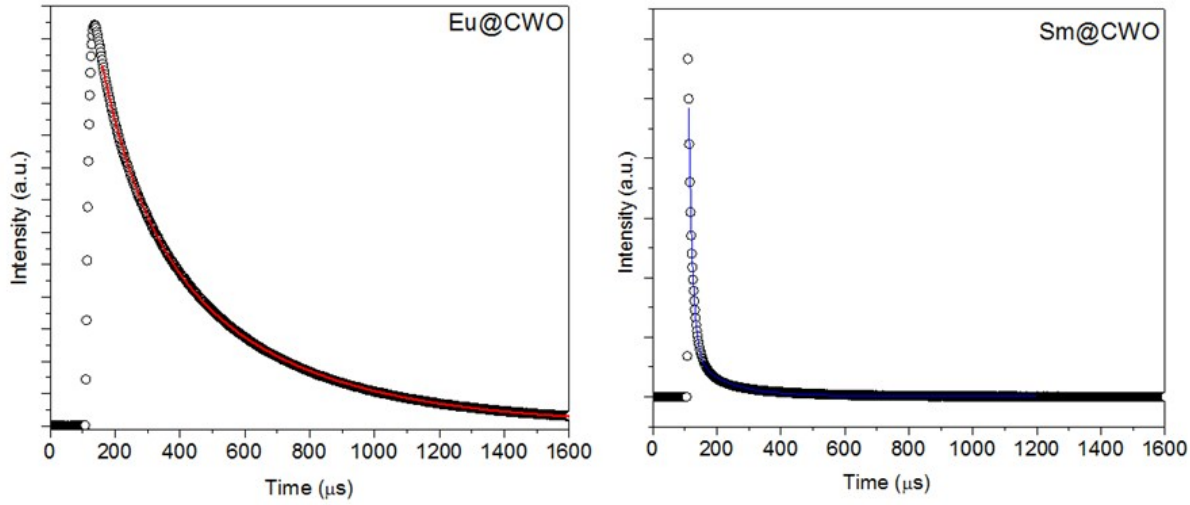

Figure S7: Lifetime profile **Eu@CWO** (left) and **Sm@CWO** (right) with λ_{ex} of 395 and 405 nm respectively. The red and blue traces represent the best fitting profiles.