

Supporting Information

**Large-scale synthesis of $\text{Ce}_x\text{La}_{1-x}\text{F}_3$
nanocomposite scintillator materials**

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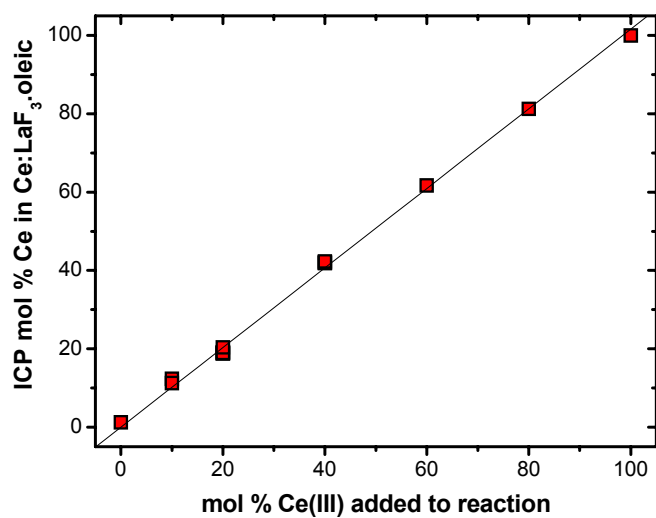


Figure S1. Percent of Ce(III) doping in nanocomposites (mol %) as a function of percent Ce(III) precursors in the original reaction mixture.

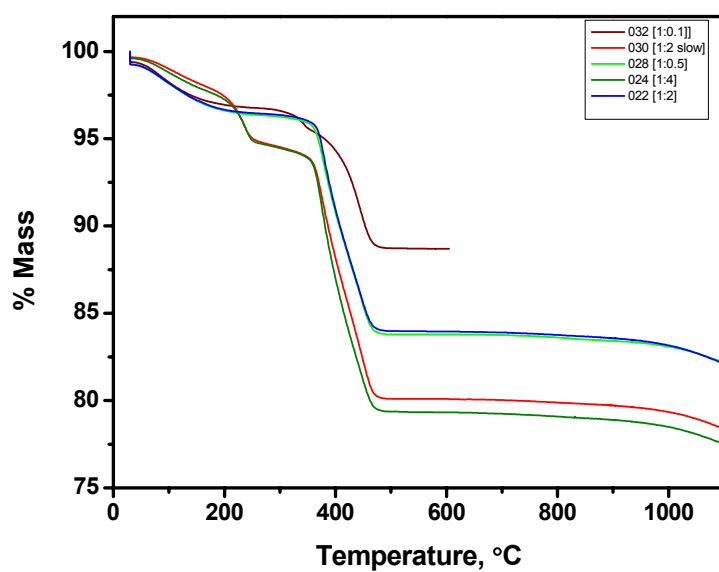


Figure S2. TGA traces for several Ce_xLa_{1-x}F₃·OA nanocomposites.

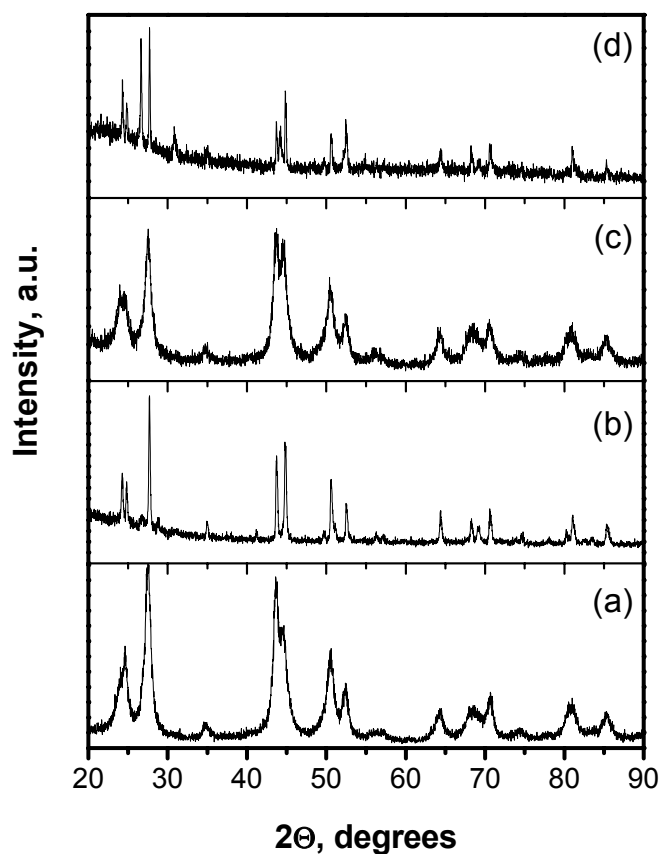


Figure S3. Powder XRD patterns for nanocomposites $\text{Ce}_{0.19}\text{La}_{0.81}\text{F}_3 \cdot 0.05 \text{ OA}$ (hard, white powder) as-prepared (a) and heated to 600°C (b), and transparent gel $\text{Ce}_{0.19}\text{La}_{0.81}\text{F}_3 \cdot 0.24 \text{ OA}$ as-prepared (c) and heated to 1100°C (d). (b) indicates a highly pure, crystalline trigonal CeF_3 , while (d) also shows impurities both of Ce_2O_3 and of what is suspected to be tetragonal CeF_3 .

Table S1. Composition of representative samples of the $Ce_xLa_{1-x}F_3 \cdot OA$ nanocomposites.

Sample	Ce(III) ICP mol % ^a	La(III) ICP mol % ^a	Oleic Acid ICP Equiv. ^a	$Ce_xLa_{1-x}F_3$ in comp, Mol %	$Ce_xLa_{1-x}F_3$ in comp, vol %	Density of comp, g/cm ³	Nanocomposite Formula
A	0.0	100.0	0.34	67%	24%	2.07	LaF ₃ ·0.35(oleic)
B	10.7	89.2	0.31	69%	26%	2.15	Ce _{0.11} La _{0.89} F ₃ ·0.31(oleic)
C	12.3	87.6	0.14	83%	44%	3.05	Ce _{0.12} La _{0.88} F ₃ ·0.14(oleic)
D	18.9	81.0	0.06	92%	64% ^b	4.07	Ce _{0.19} La _{0.81} F ₃ ·0.05(oleic)
E	19.1	80.8	0.09	88%	53%	3.53	Ce _{0.19} La _{0.81} F ₃ ·0.09(oleic)
F	20.3	79.6	0.22	76%	33%	2.51	Ce _{0.20} La _{0.80} F ₃ ·0.22(oleic)
G	19.1	80.8	0.24	74%	31%	2.41 ^c	Ce _{0.19} La _{0.81} F ₃ ·0.24(oleic)
H	18.7	81.2	0.21	77%	34%	2.56	Ce _{0.19} La _{0.81} F ₃ ·0.21(oleic)
I	42.0	57.9	0.07	90%	59% ^d	3.80	Ce _{0.42} La _{0.58} F ₃ ·0.07(oleic)
J	41.8	58.1	0.18	80%	38%	2.74	Ce _{0.42} La _{0.58} F ₃ ·0.18(oleic)
K	61.6	38.3	0.28	71%	28%	2.25	Ce _{0.62} La _{0.38} F ₃ ·0.28(oleic)
L	81.2	18.7	0.16	82%	41%	2.88	Ce _{0.81} La _{0.19} F ₃ ·0.16(oleic)
M	100.0	0.0	0.13	84%	45%	3.08	CeF ₃ ·0.13(oleic)

- a) Determined by ICP measurements of nanocomposite digested in 5% HNO₃. b) Sample is an opaque powder. c) Density as measured by water displacement is 2.44 g/cc. d) Sample is a transparent wax at 1 cm thick.