Supplementary information for the article:

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Supplementary file

The low-temperature sonochemical synthesis of up-converting β $NaYF_4$:Yb,Er mesocrystals

Marina Vukovic[1], Ivana Dinic[2], Paula Jardim[3], Smilja Markovic[2], Ljiljana Veselinovic[2], Marko Nikolic[4], Lidija Mancic[2]

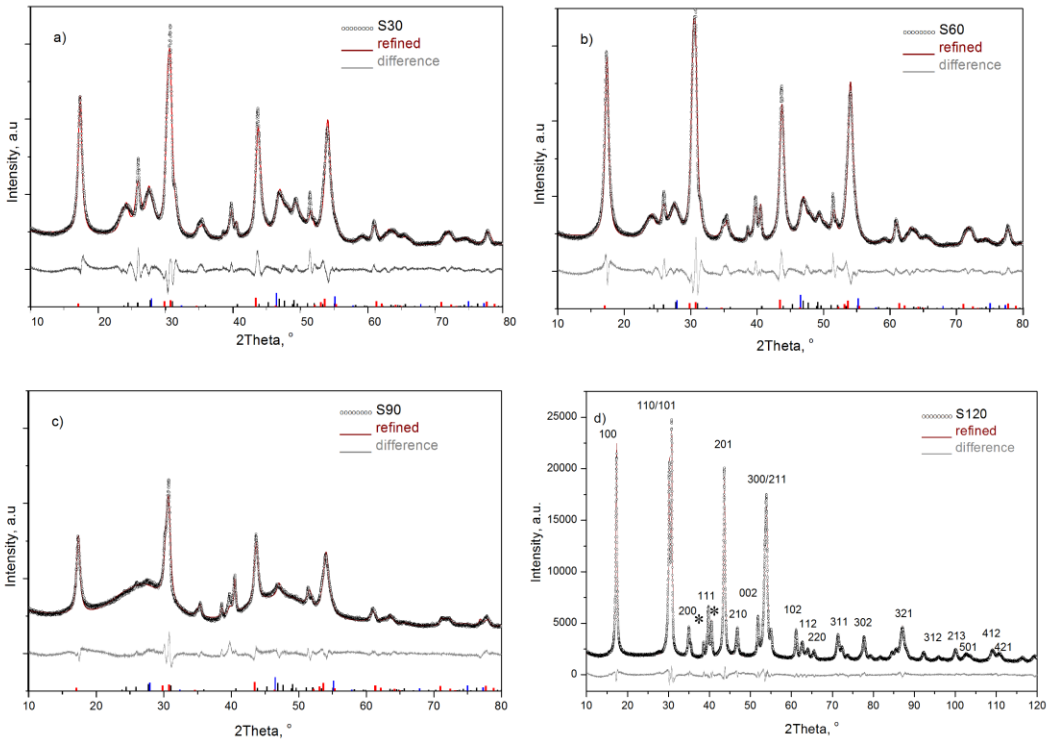

Figure S1. XRPD data and refined patterns of the obtained samples. The Bragg positions of the orthorhombic YF_3 (JCPDS 70-1935) cubic $NaYF_4$ (JCPDS 77-2042) and hexagonal $NaYF_4$ (JCPDS 16-0334) are presented as bottom bar lines (orthorhombic-black, cubic-blue, hexagonal-red). Two reflections marked with * in Fig S1d originate from Ti contamination (titanium horn is used during synthesis)

Table 1. Microstructural parameters obtained through Rietveld refinement of Yb,Er doped β-$NaYF_4$ phase

S.G.	*$P6_3/m$*		
a, Å	5.934 (1)		
c, Å	3.529 (1)		
V, Å^3	107.61		
CS, nm	37.6 (4)		
MS	0.31 (1)		
R_{wp}	5.1		
R_{brag}	1.1		
Atom position	x	y	c
Na1/Y1	2/3	2/3	1/4
Na2/Y2	0	0	0.619 (1)
F	0.3098 (3)	0.4009 (4)	1/4

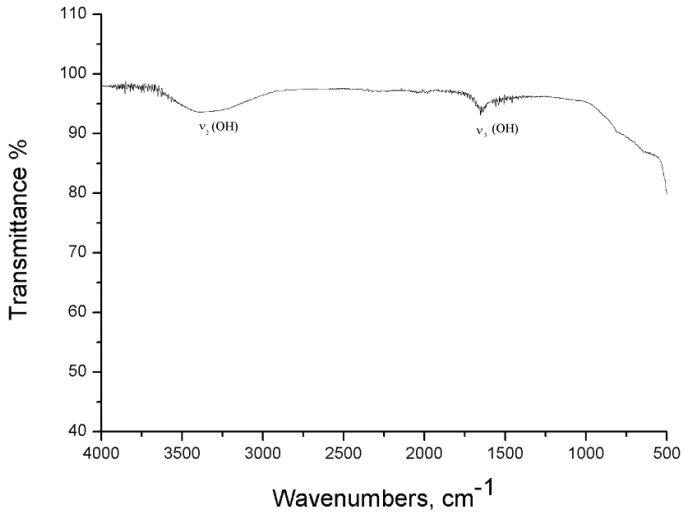

Figure S2. Typical spectrum of FT-IR analysis

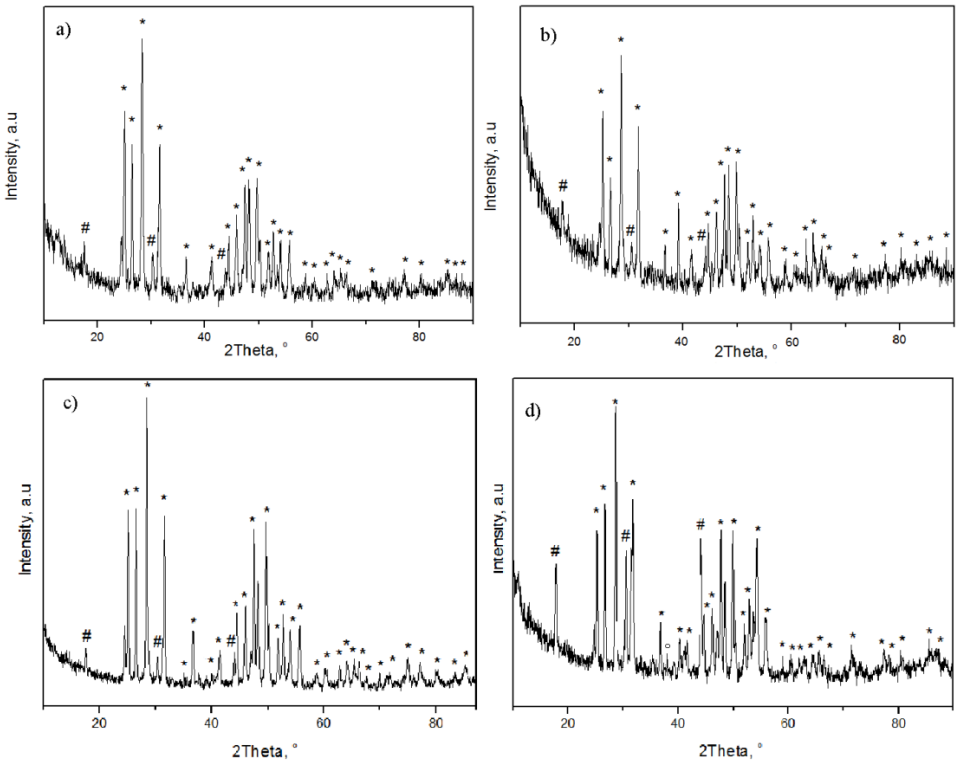

Figure S3. XRPD of samples obtained through sonochemical synthesis after DSC analysis a) S30, b)S60, c)S90, d) S120; XRPD reflections of β-$NaYF_4$;Yb,Er are marked with $^{\#}$, while these of YF_3:Yb,Er with *. NaF presence is indictable in the thermally treated S120 sample due appearance of its strongest reflection at 2θ=38.85 marked with ^{o} in Fig. S3d.

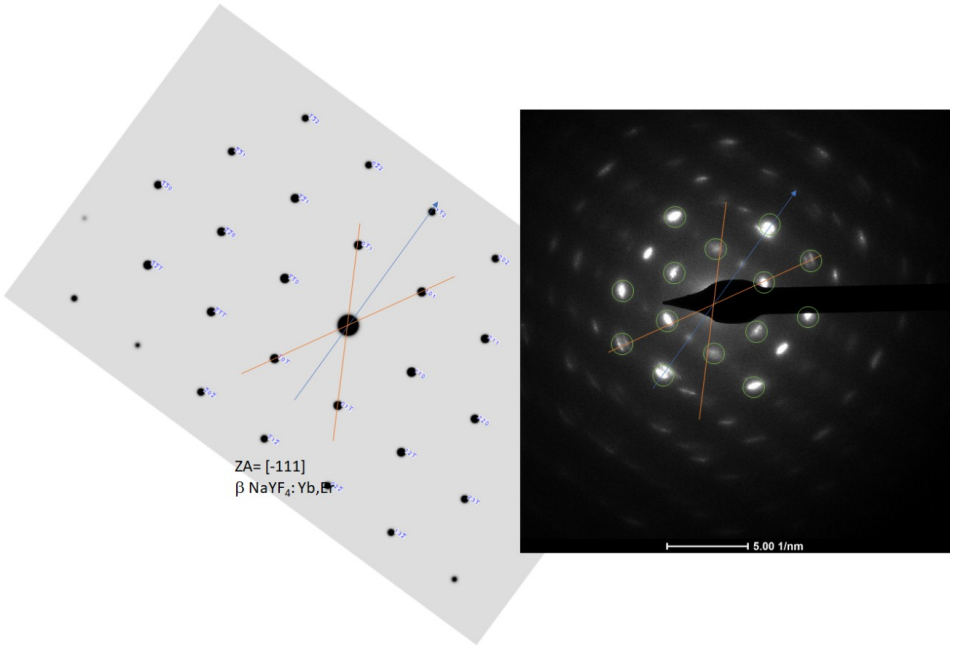

Figure S4: Simulated electron diffraction pattern of β $NaYF_4$:Yb,Er hexagonal [-111] zone axis compared with experimental SAED. Blue arrow corresponds to growth direction.

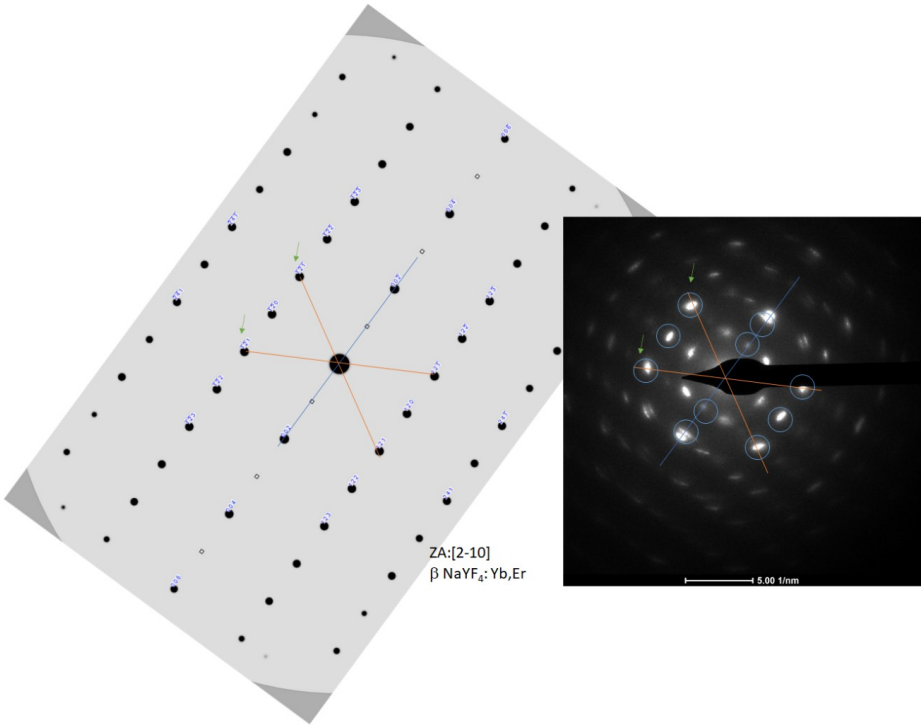

Figure S5: Simulated electron diffraction pattern of β $NaYF_4$:Yb,Er hexagonal [2-10] zone axis compared with experimental SAED. Note that the (121) planes are present in both zone axis (marked with green arrows). Blue arrow corresponds to growth direction.