Supporting information

Enhancing Luminescence Intensity of Eu^{3+}-Activated $NaYb(MoO_4)_2$ Phosphors through Bismuth Doping: Judd-Ofelt Analysis, Lighting, and Temperature-Sensing Applications.

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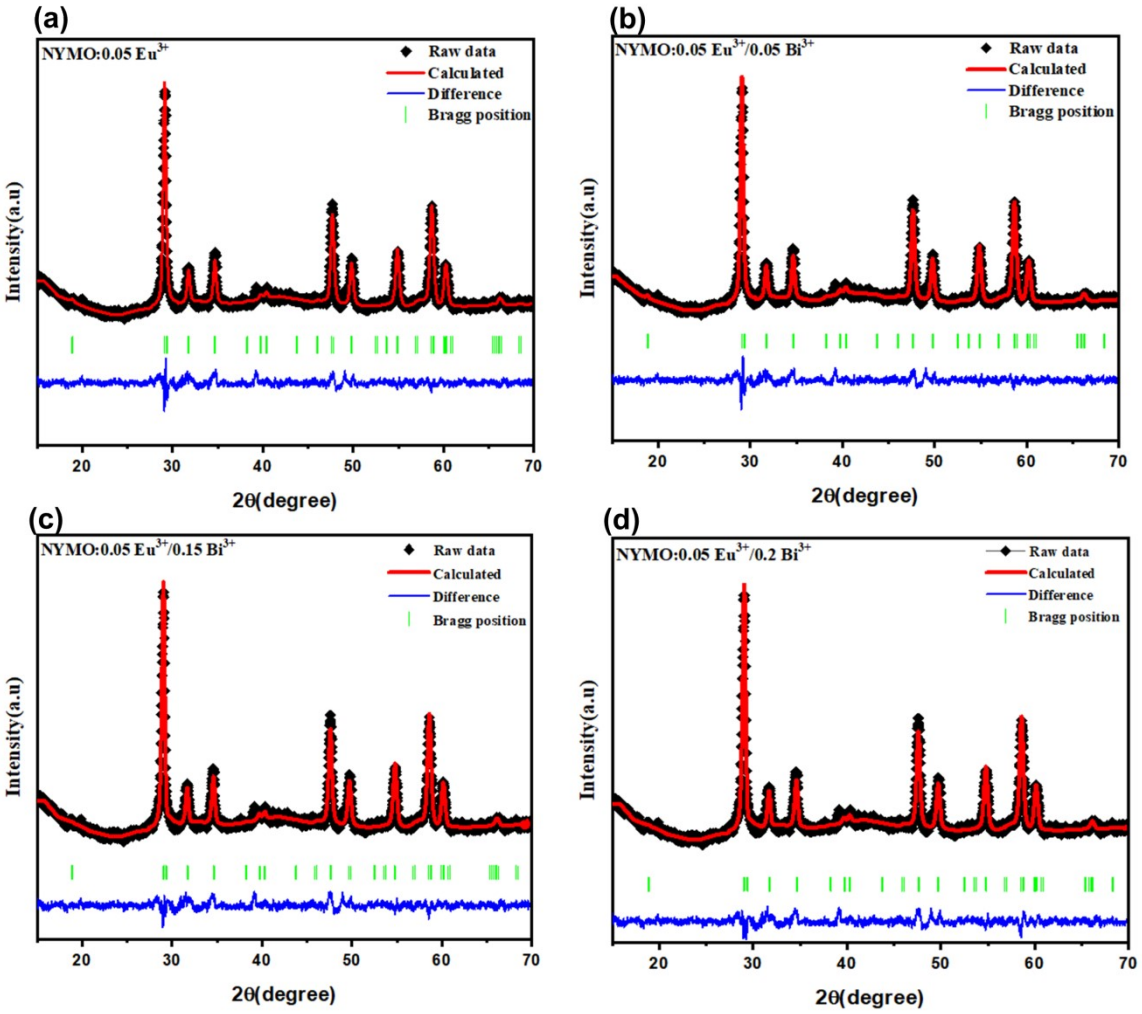

Figure S1. Rietveld refinement of the XRD pattern of NYMO: 0.05 Eu^{3+} /y Bi^{3+} fitted with tetragonal I41/a space group.

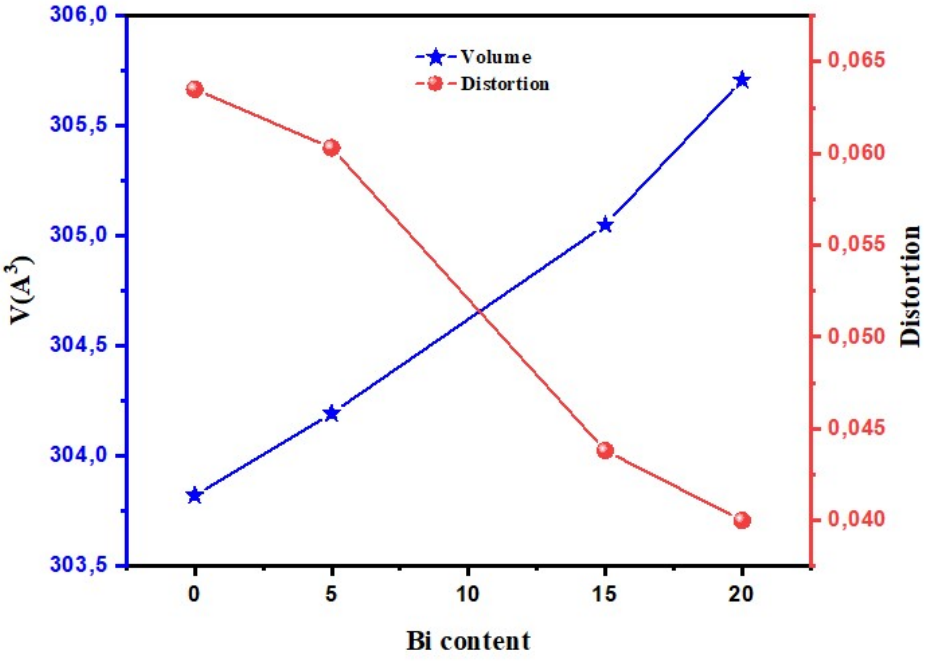

Figure S2. The relations between the cell volume and the degree of crystal distortion vs the doping concentrations of Bi^{3+}.

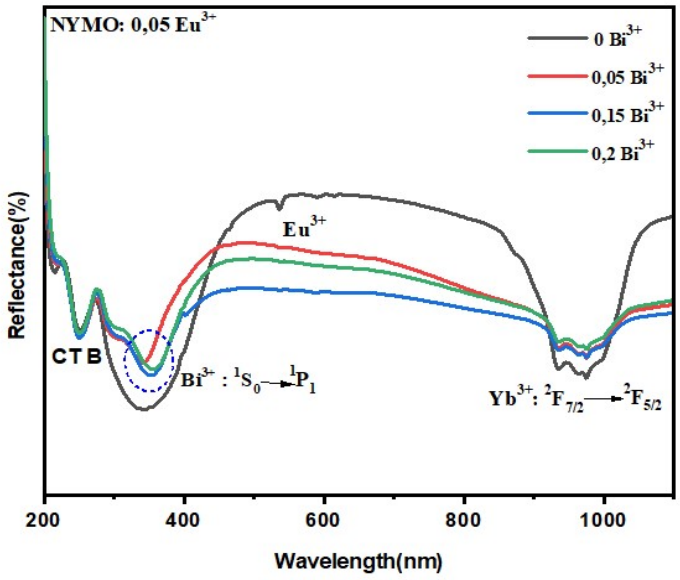

Figure S3. Diffuse reflectance spectra of the NYMO: $0.05Eu^{3+}/yBi^{3+}$ samples.

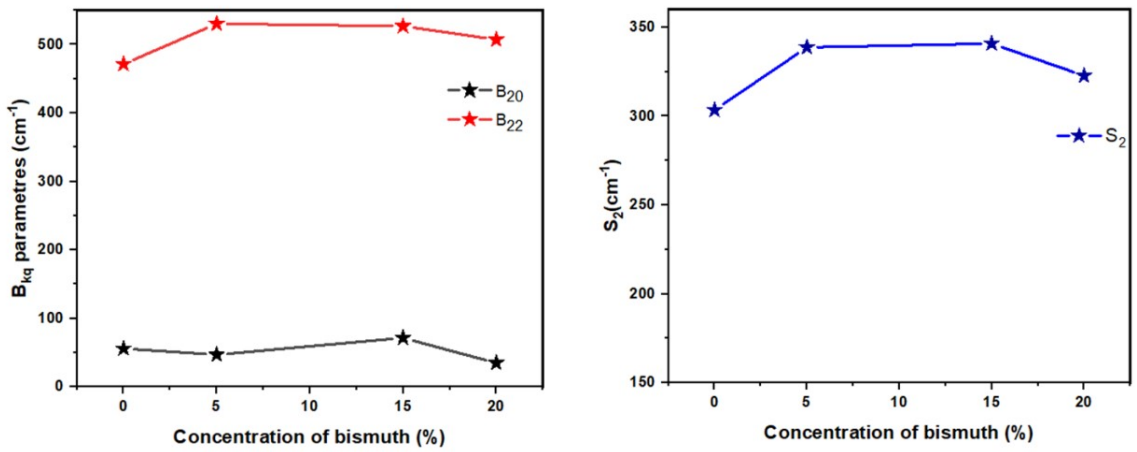

Figure S4. Variation in phenomenological CF parameters and S_2 with different concentration of bismuth.

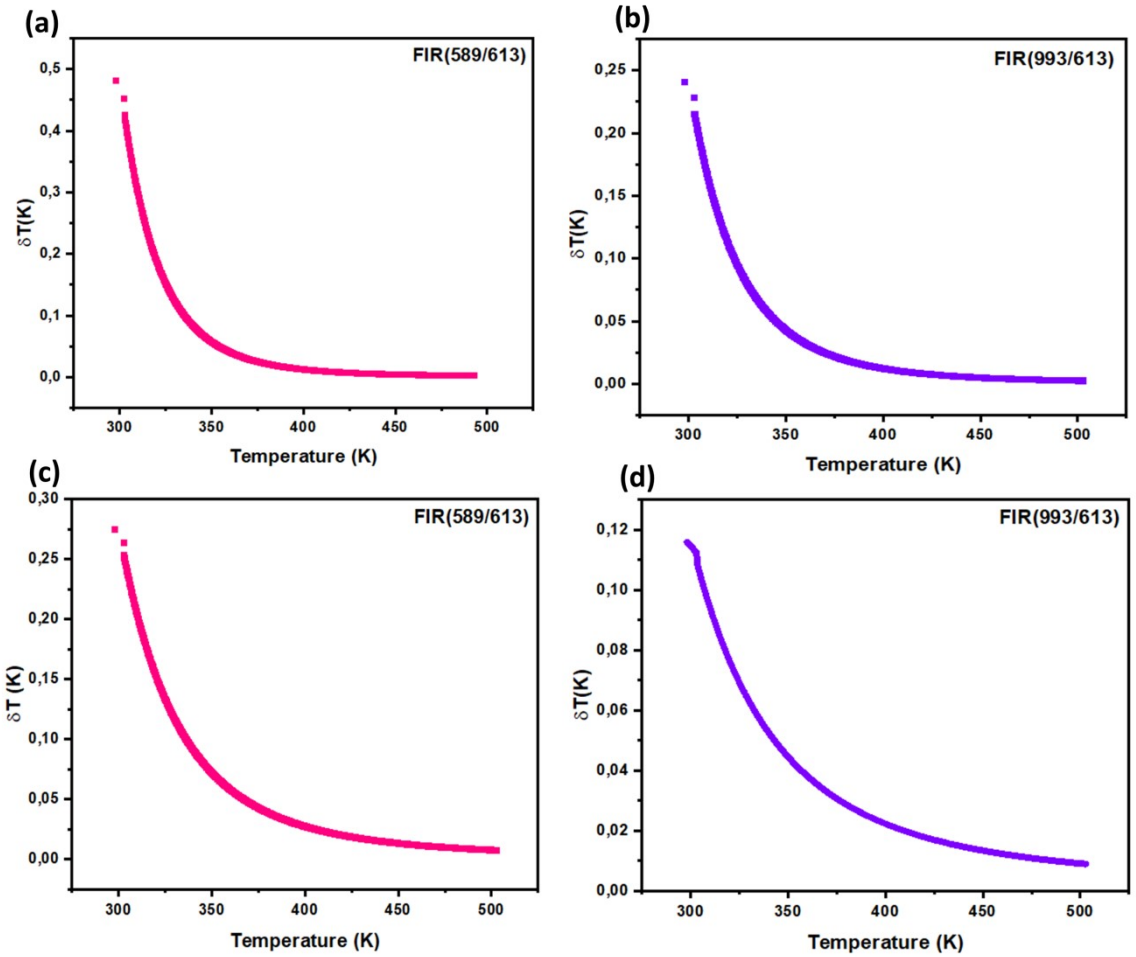

Figure S5. Temperature uncertainty δT of NYMO for **(a)** 0.05 Eu^{3+} and **(b)** 0.05 Eu^{3+}/0.05Bi^{3+}.

Table S1. Lattice constants and refinement parameters of NYMO: 0.05 Eu^{3+},y Bi^{3+} phosphors.

	0 Bi^{3+}	**0.05 Bi^{3+}**	**0.15 Bi^{3+}**	**0.2 Bi^{3+}**
V(A^3)	**303.8215**	**304.1943**	**305.0504**	**305.7077**
a=	**5.1857**	**5.1877**	**5.1924**	**5.1966**
b=	**5.1857**	**5.1877**	**5.1924**	**5.1966**
c=	**11.2981**	**11.3032**	**11.3146**	**11.3206**
α,□,γ	**90**	**90**	**90**	**90**

Table S2. Main bond lengths (Å) of NYMO: 0.05 Eu^{3+} /yBi^{3+}.

Chemical bond	**0 Bi^{3+}**	**0.05 Bi^{3+}**	**0.15 Bi^{3+}**	**0.2 Bi^{3+}**
Yb^{3+}/Eu^{3+}-O_1	2.4472	2.4517	2.4002	2.3994
Yb/Eu-O_2	2.3660	2.3660	2.3645	2.3600
Mo-O	1.7966	1.8001	1.9000	1.8854

Table S3: Chromaticity coordinates and CCT values S_{1-4} phosphors.

Sample	**CIE(x,y)**	**CTT(K)**	**Colar purity**
NYMO : 0.05 Eu^{3+}/0 Bi^{3+}	(0.589, 0.345)	1977	76.82
NYMO : 0.05 Eu^{3+}/ 0.05 Bi^3	(0.628,0.353)	2232	87.21
NYMO : 0.05 Eu^{3+}/0.15 Bi^3	(0.624,0.352)	2208	85.41
NYMO :0.05 Eu^{3+}/0.2 Bi^3	(0.629,0.352)	2262	86.75

Table S4: The average J–O intensity parameters of Eu^{3+}/yBi^{3+} in NYMO crystal.

Concentrations	**0 Bi^{3+}**	**0.05 Bi^{3+}**	**0.15 Bi^{3+}**	**0.2 Bi^{3+}**
Ω_2 (10^{-20} cm^2)	14.665	15.182	14.729	14.858
Ω_4 (10^{-20} cm^2)	4.186	3.351	3.515	3.204
Ω_2/ Ω_4	3.5	4.53	4.19	4.64

Table S5: Crystal field parameters in NYMO: 0.05 Eu^{3+}/yBi^{3+}.

	B_{20} (cm^{-1})	B_{22} (cm^{-1})	S_2 (cm^{-1})
0.05 Eu^{3+}	55.8	471.6	303.44
0.05 Eu^{3+}/0.05 Bi^{3+}	46.92	530.33	338.68
0.05 Eu^{3+}/0.15 Bi^{3+}	71.38	526.91	335.81
0.05 Eu^{3+}/0.2 Bi^{3+}	34.73	507.21	322.66

Table S6: Crystal field parameters in various host matrices.

Samples	B_{20} (cm^{-1})	B_{22} (cm^{-1})	S_2 (cm^{-1})	Ref
Y_2O_3 :Eu^{3+}	276	740	673	**[50]**
Gd_2O_3 :Eu^{3+}	218	701	662	**[51]**
$NaYb(MoO_4)_2$:Eu^{3+}/Bi^{3+}	46.92	530.33	338.68	**This work**

Table S7: Decomposition of the D_j into irreducible representations of the simple group S_4.

D_J	S_4
D_0	A
D_1	A+E
D_2	A+2B+E
D_3	A+2B+2 E
D_4	3A+2B+2 E
D_5	3A+2B+3 E
D_6	3A+4B+3 E