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Supplementary Materials

The Structure and Optical Properties of Luminescent Terbium Terephthalate Metal-Organic Frameworks Doped by Yttrium, Gadolinium, and Lanthanum Ions

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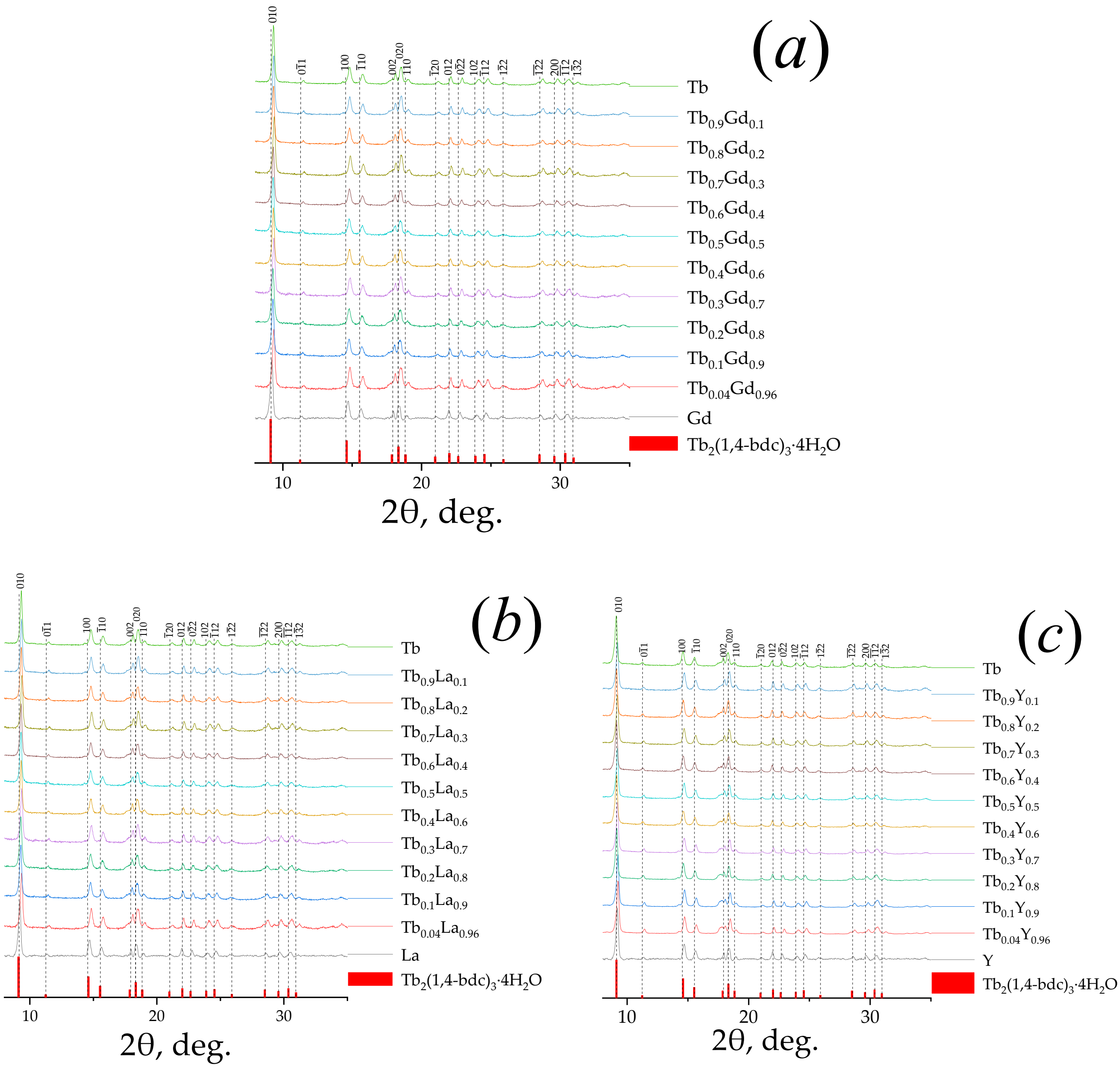

Figure S1. The powder X-ray diffraction (PXRD) patterns of the synthesized compounds series: (*a*) $(Tb_xGd_{1-x})_2(1,4\text{-}bdc)_3\cdot nH_2O$ (x = 0.001-1) including the $Gd_2(1,4\text{-}bdc)_3\cdot nH_2O$, (*b*) $(Tb_xLa_{1-x})_2(1,4\text{-}bdc)_3\cdot nH_2O$ (x = 0.001-1) including the $La_2(1,4\text{-}bdc)_3\cdot nH_2O$, (*c*) $(Tb_xY_{1-x})_2(1,4\text{-}bdc)_3\cdot nH_2O$ (x = 0.001-1) including the $Y_2(1,4\text{-}bdc)_3\cdot nH_2O$. The positions and relative intensities of diffraction maxima of $Tb_2(1,4\text{-}bdc)_3\cdot 4H_2O$ taken from ref. [35] are shown as bars.

Table S1. Unit cell parameters of the $(Tb_xM_{1-x})_2(1,4\text{-bdc})_3\cdot4H_2O$ (M = Y, La, Gd; x = 0.04-1). The parameters obtained within the same series of connections are separated from each other inside the table by a bold line

$(Tb_xLa_{1-x})_2(1,4\text{-bdc})_3\cdot4H_2O$							
x	**V, Å³**	**a, Å**	**b, Å**	**c, Å**	**α, °**	**β, °**	**γ, °**
0.04	628.9±0.5	6.258±0.003	10.238±0.004	10.305±0.005	102.491±0.014	91.984±0.019	101.758±0.015
0.1	630.3±0.5	6.265±0.003	10.244±0.004	10.309±0.004	102.465±0.011	91.937±0.015	101.763±0.012
0.2	626.8±0.4	6.251±0.002	10.222±0.003	10.288±0.003	102.432±0.009	91.769±0.014	101.704±0.010
0.3	622.2±0.3	6.236±0.002	10.195±0.003	10.263±0.003	102.391±0.008	91.708±0.012	101.678±0.009
0.4	621.1±0.2	6.233±0.002	10.182±0.002	10.257±0.002	102.362±0.008	91.608±0.012	101.605±0.006
0.5	616.8±0.2	6.219±0.001	10.155±0.002	10.232±0.002	102.308±0.007	91.547±0.010	101.584±0.008
0.6	613.1±0.2	6.207±0.001	10.131±0.011	10.208±0.002	102.275±0.007	91.524±0.011	101.521±0.008
0.7	610.4±0.2	6.196±0.001	10.118±0.002	10.192±0.002	102.259±0.006	91.497±0.001	101.564±0.007
0.8	609.0±0.4	6.198±0.002	10.108±0.003	10.175±0.003	102.253±0.009	91.460±0.015	101.456±0.011
0.9	605.7±0.4	6.186±0.002	10.096±0.003	10.148±0.004	102.216±0.009	91.428±0.015	101.403±0.011
1	604.1±0.6	6.184±0.004	10.089±0.005	10.126±0.006	102.114±0.012	91.53±0.020	101.385±0.015
$(Tb_xGd_{1-x})_2(1,4\text{-bdc})_3\cdot4H_2O$							
x	**V, Å³**	**a, Å**	**b, Å**	**c, Å**	**α, °**	**β, °**	**γ, °**
0.04	605.3±0.4	6.183±0.003	10.094±0.004	10.147±0.004	102.189±0.011	91.451±0.017	101.411±0.014
0.1	603.1±0.4	6.176±0.003	10.083±0.004	10.134±0.004	102.176±0.011	91.472±0.017	101.413±0.014
0.2	603.8±0.5	6.179±0.003	10.086±0.004	10.137±0.005	102.174±0.013	91.48±0.02	101.423±0.016
0.3	605.7±0.5	6.184±0.004	10.102±0.005	10.144±0.005	102.175±0.012	91.45±0.02	101.412±0.016
0.4	604.5±0.4	6.181±0.003	10.091±0.003	10.140±0.003	102.099±0.010	91.512±0.015	101.405±0.013
0.5	601.4±0.4	6.175±0.003	10.072±0.004	10.121±0.004	102.148±0.012	91.513±0.019	101.395±0.015
0.6	602.1±0.4	6.174±0.002	10.077±0.003	10.126±0.003	102.145±0.010	91.535±0.016	101.400±0.012
0.7	603.7±0.5	6.179±0.003	10.091±0.004	10.128±0.005	102.151±0.011	91.426±0.019	101.442±0.014
0.8	601.8±0.3	6.174±0.002	10.075±0.003	10.121±0.003	102.153±0.010	91.435±0.016	101.426±0.013
0.9	601.4±0.3	6.175±0.002	10.069±0.003	10.118±0.003	102.134±0.009	91.467±0.015	101.398±0.013
1	604.1±0.6	6.184±0.004	10.089±0.005	10.126±0.006	102.114±0.012	91.53±0.02	101.385±0.015
$(Tb_xY_{1-x})_2(1,4\text{-bdc})_3\cdot4H_2O$							
x	**V, Å³**	**a, Å**	**b, Å**	**c, Å**	**α, °**	**β, °**	**γ, °**
0.04	594.8±0.2	6.157±0.003	10.031±0.002	10.068±0.002	102.039±0.007	91.527±0.010	101.333±0.009
0.1	594.7±0.2	6.156±0.002	10.031±0.002	10.069±0.002	102.044±0.007	91.520±0.010	101.331±0.009
0.2	595.6±0.3	6.158±0.002	10.037±0.00	10.074±0.003	102.040±0.007	91.530±0.012	101.336±0.010

0.3	596.1±0.3	6.160±0.002	10.041±0.002	10.078±0.002	102.064±0.008	91.535±0.012	101.340±0.010
0.4	596.3±0.3	6.159±0.002	10.042±0.003	10.082±0.003	102.065±0.009	91.521±0.015	101.360±0.012
0.5	596.4±0.3	6.159±0.002	10.042±0.002	10.085±0.003	102.075±0.019	91.518±0.013	101.367±0.011
0.6	597.4±0.3	6.161±0.002	10.051±0.003	10.088±0.003	102.083±0.009	91.478±0.014	101.375±0.011
0.7	598.6±0.3	6.165±0.002	10.056±0.003	10.097±0.005	102.101±0.009	91.480±0.014	101.365±0.012
0.8	597.6±0.6	6.161±0.002	10.051±0.003	10.093±0.003	102.093±0.00	91.502±0.014	101.388±0.011
0.9	598.9±0.3	6.165±0.002	10.060±0.003	10.100±0.003	102.111±0.009	91.502±0.015	101.378±0.012
1	604.1±0.6	6.184±0.004	10.089±0.005	10.126±0.006	102.114±0.012	91.53±0.02	101.385±0.015

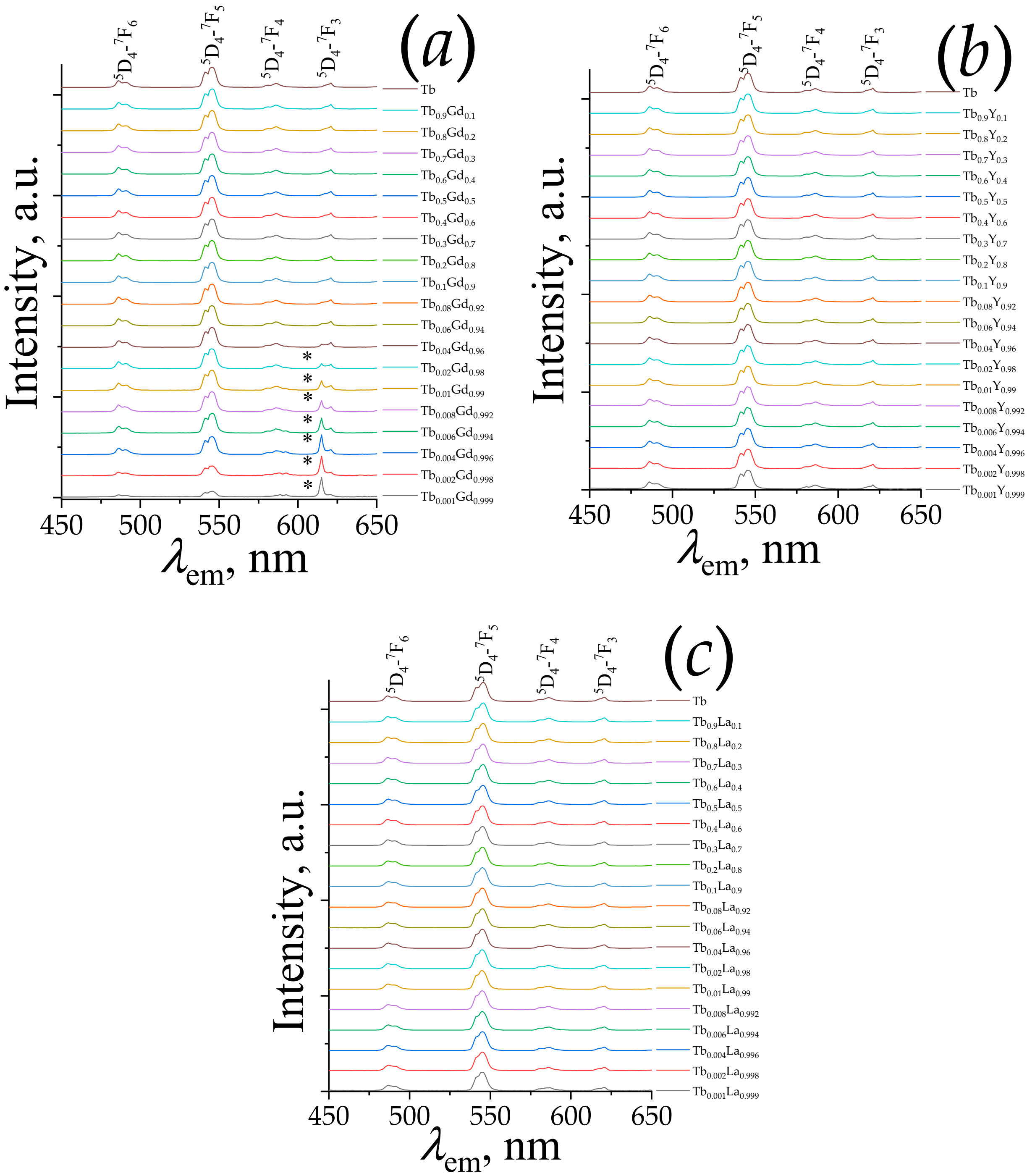

Figure S2. The normalized emission spectra of (*a*) $(Tb_xGd_{1-x})_2(1,4\text{-bdc})_3\cdot 4H_2O$, (*b*) $(Tb_xY_{1-x})_2(1,4\text{-bdc})_3\cdot 4H_2O$, (*c*) $(Tb_xLa_{1-x})_2(1,4\text{-bdc})_3\cdot 4H_2O$ at a wide concentration range of Tb^{3+} (x = 0.001-1; given in legend) upon 320 nm excitation. The artefact maxima peaked at 615 nm (marked as *) correspond to the Eu^{3+} present as impurities in the gadolinium nitrate used for the synthesis.

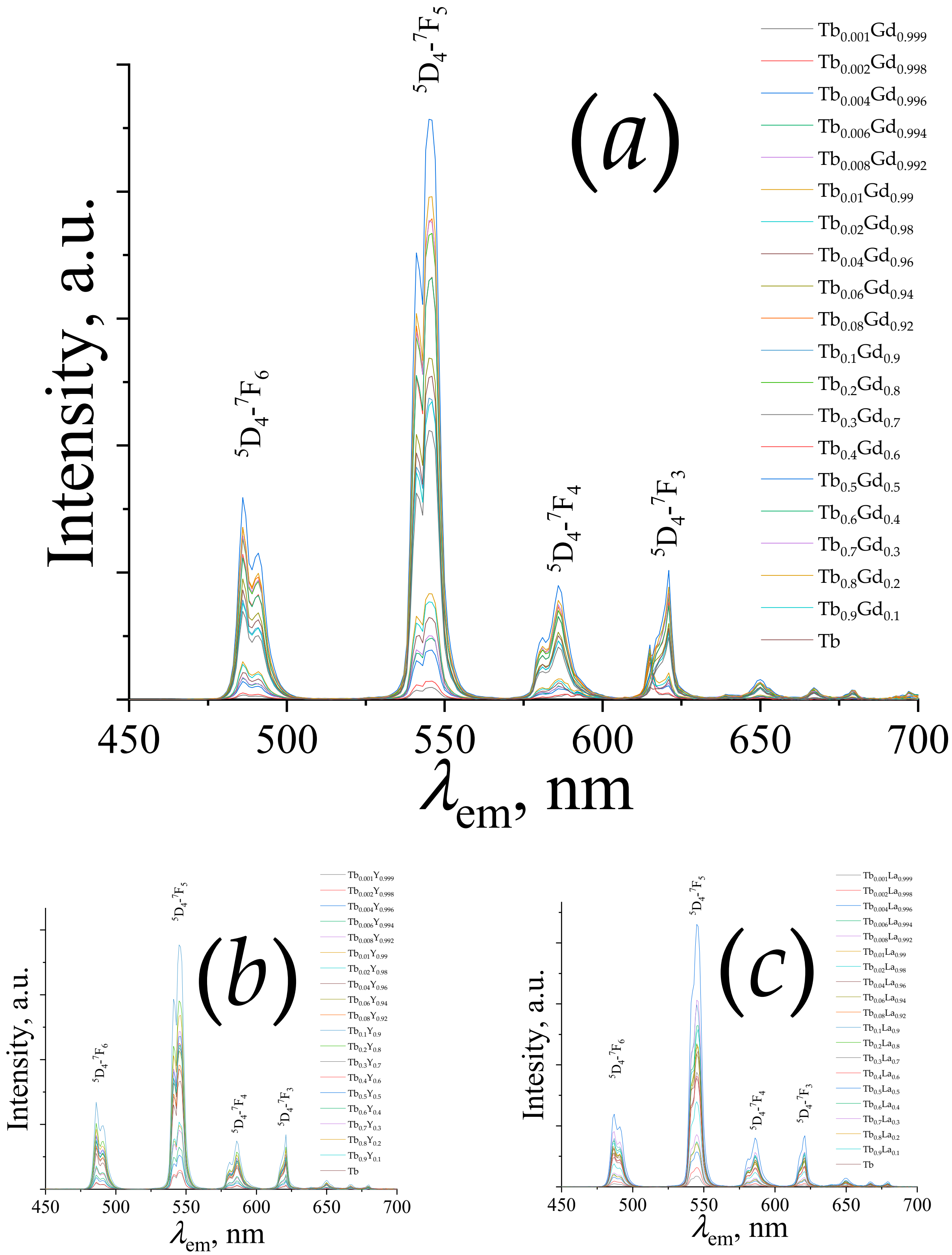

Figure S3. The superimposed emission spectra of (*a*) $(Tb_xGd_{1-x})_2(1.4\text{-bdc})_3{\cdot}4H_2O$, (*b*) $(Tb_xLa_{1-x})_2(1.4\text{-bdc})_3{\cdot}4H_2O$, (*c*) $(Tb_xY_{1-x})_2(1.4\text{-bdc})_3{\cdot}4H_2O$ at a wide concentration range of Tb^{3+} (x = 0.001-1; give in legend) upon 320-nm excitation.

Table S2. Tb^{3+} atomic fractions (at.%) in the synthesized compounds namely $(Tb_xM_{1-x})_2(1,4\text{-bdc})_3 \cdot 4H_2O$. Measured data obtained from EDX.

X_{Tb} (at.%), theoretical	X_{Tb} (at.%) in Tb-La series	X_{Tb} (at.%) in Tb-Gd series	X_{Tb} (at.%) in Tb-Y series
0,1		Low then the LOD*	
0,2		Low then the LOD	
0,4		Low then the LOD	
0,6		Low then the LOD	
0,8		Low then the LOD	
1	1 ± 1	1 ± 1	2 ± 1
2	2 ± 1	2 ± 1	2 ± 1
4	4 ± 1	3 ± 1	4 ± 1
6	7 ± 1	5 ± 1	7 ± 1
8	10 ± 1	7 ± 1	9 ± 1
10	14 ± 1	9 ± 1	12 ± 1
20	25 ± 1	19 ± 1	22 ± 1
30	36 ± 2	28 ± 2	34 ± 2
40	46 ± 2	42 ± 2	43 ± 2
50	56 ± 3	55 ± 3	51 ± 3
60	65 ± 4	65 ± 4	59 ± 4
70	74 ± 4	75 ± 4	70 ± 4
80	82 ± 5	84 ± 5	85 ± 5
90	90 ± 5	92 ± 5	92 ± 5
100	100	100	100

*LOD – limit of detection.