Electronic Supplementary Information (ESI):

Hydrothermal Approach and Luminescent Properties for Synthesis of Orthoniobates $GdNbO_4:Ln^{3+}$ (Ln = Dy, Eu) Single Crystals under High-Temperature High-Pressure Conditions

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Fig. S1 Model HR-1B-2, LECO hydrothermal synthesis reactor

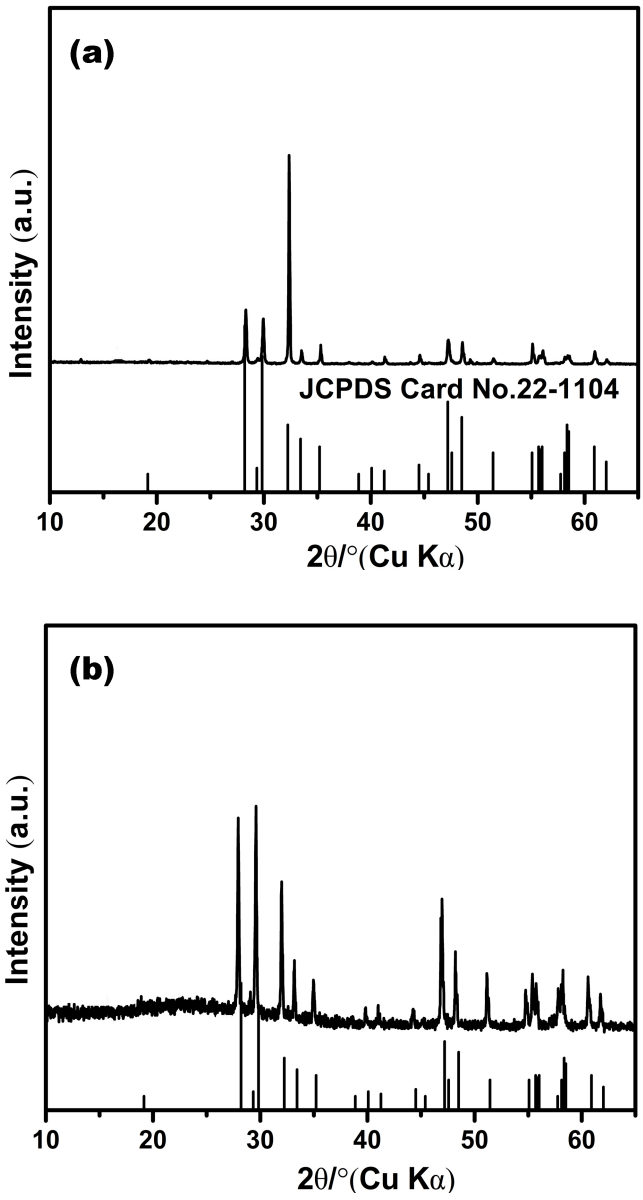

Fig. **S2.** (a) Power XRD pattern of the as-synthesized Dy^{3+} doped $GdNbO_4$; (b) Power XRD pattern of the as-synthesized Eu^{3+} doped $GdNbO_4$.

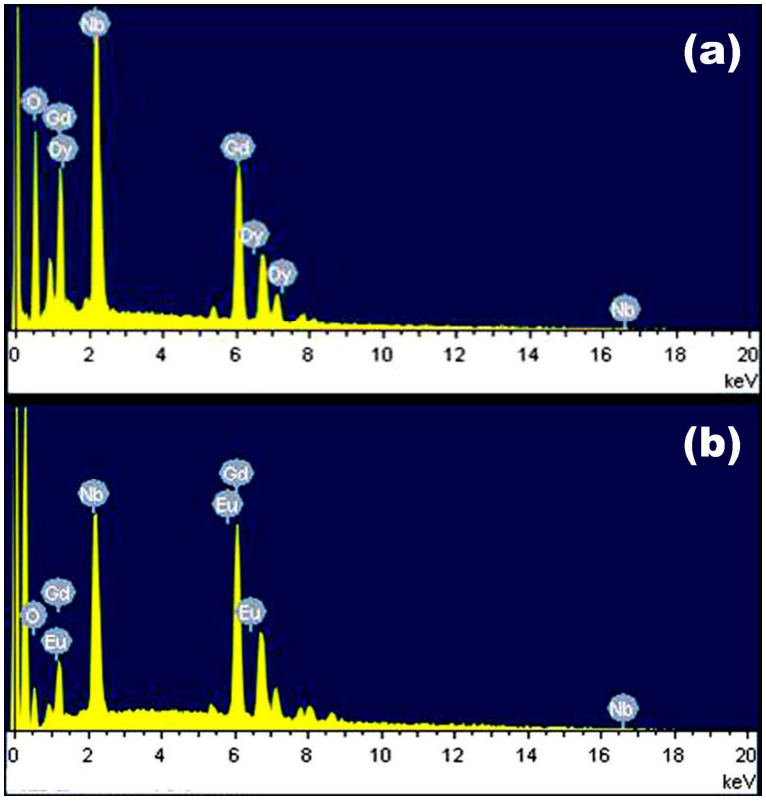

Fig. S3 (a) EDS spectrum of the as-synthesized Dy^{3+} doped $GdNbO_4$. (b) EDS spectrum of the as-synthesized Eu^{3+} doped $GdNbO_4$.

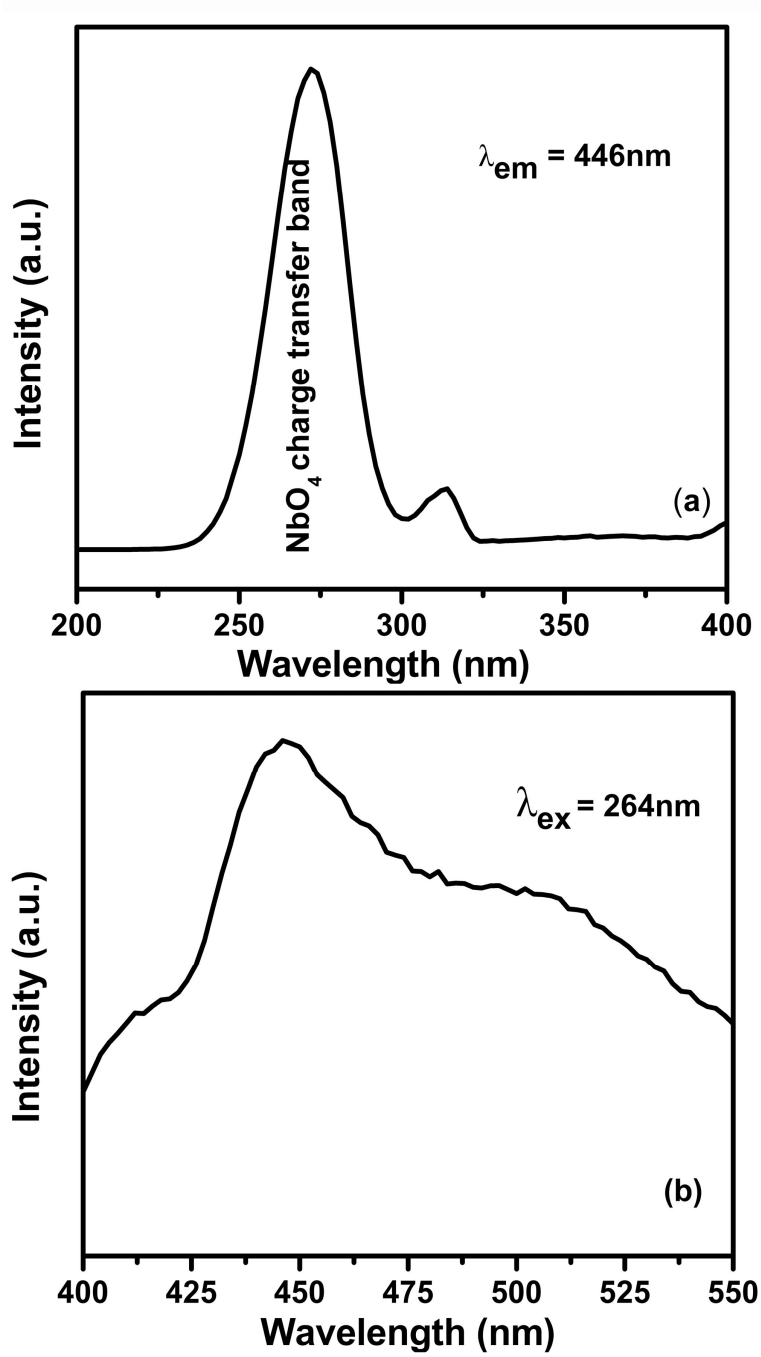

Fig. S4 (a) Excitation (a) and emission (b) spectra of $GdNbO_4$.

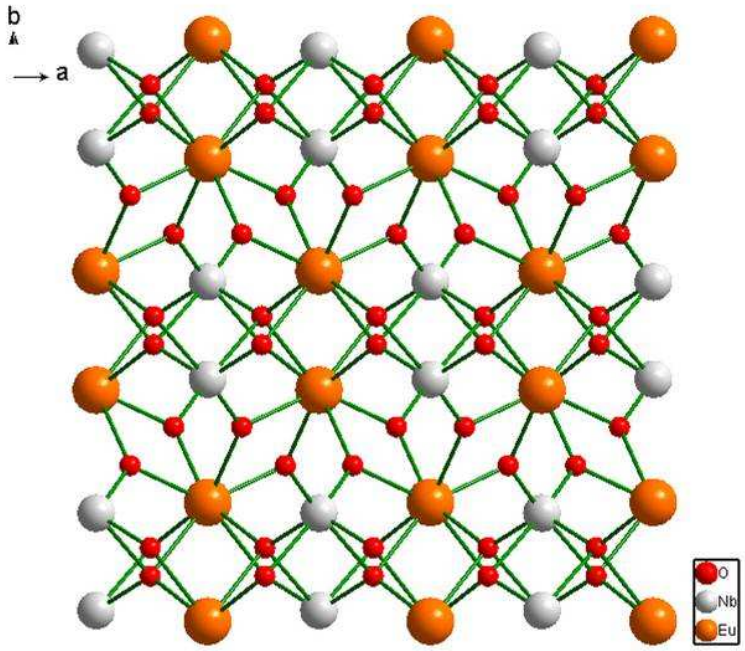

Fig. S5. Crystal structure of Eu^{3+} doped $GdNbO_4$ showing coordination geometry of the GdO_8 polyhedron and NbO_6 polyhedron therein and 3D packing viewed along the c axis. Orange, white and red spheres represent Eu, Nb and O atoms, respectively.

Table S1. Crystallographic Data for $Gd(OH)_3$

Chemical formula	$Gd(OH)_3$
Formula weight (g/mol)	205.25
Temperature (K)	296(2)
Wavelength (nm)	0.071073 (Mo)
Crystal system	hexagonal
Unit cell dimensions/nm	a = 0.6350 (12) b = 0.6350 (12) c = 0.3642 (15)
Cell volume (nm^3), Z	0.1272 (6), 2
Density (g/cm^3), calculated	5.360
Crystal size (mm)	0.1×0.030×0.030
Θ range for data collection	3.71-24.61 °
Goodness-of-fit on F^2	1.263
Final R indices [$I > 2\sigma(I)$]	R_1 = 0.0199, wR_2 = 0.0467
R indices (all data)	R_1 = 0.0201, wR_2 = 0.04681
Extinction coefficient	0.33(3)
Largest diff. peak and hole/($e \cdot nm^{-3}$)	1.346 and -0.996

Table S2. Crystallographic Data for Dy^{3+}, Eu^{3+} doped $GdNbO_4$

Chemical formula	$GdNbO_4:Dy^{3+}$	$GdNbO_4:Eu^{3+}$
Formula weight (g/mol)	314.16	308.87
Temperature (K)	296(2)	296(2)
Wavelength (nm)	0.071073 (Mo)	0.071073 (Mo)
Crystal system space group	monoclinic, *C*2/*c*	Monoclinic *C*2/*c*
Unit cell dimensions/nm	*a* = 0.7160(5) *b* = 1.1170(10) *c* = 0.5139(4)	*a* = 0.7062(2) *b* = 1.1019(3) *c* = 0.5063(4)
Cell volume (nm^3), *Z*	0.3095(4), *Z* = 4	0.2956 (8), 4
Density (g/cm^3) (calculated)	6.743	6.940
Crystal size (mm)	0.05×0.03×0.03	0.08×0.050×0.050
Θ range for data collection	3.70-25.00 °	3.70-25.00 °
Goodness-of-fit on F^2	1.204	1.115
Final *R* indices [$I > 2\sigma(I)$]	R_1 = 0.0548, wR_2 = 0.1490	R_1 = 0.0515, wR_2 = 0.1604
R indices (all data)	R_1 = 0.0549, wR_2 = 0.1492	R_1 = 0.0515, wR_2 = 0.1604
Extinction coefficient	0.024(2)	0.034(6)
Largest diff. peak and hole/($e \cdot nm^{-3}$)	3.201 and -3576	3.201 and -3576