COMPREHENSION OF THE PHOTOINDUCED CHARGE TRANSFER ASSISTED ENERGY TRANSFER IN Gd^{3+} BASED HOST SENSITIZED TELLURATE PHOSPHOR FOR THERMAL SENSING AND ANTICOUNTERFEITING LABELS

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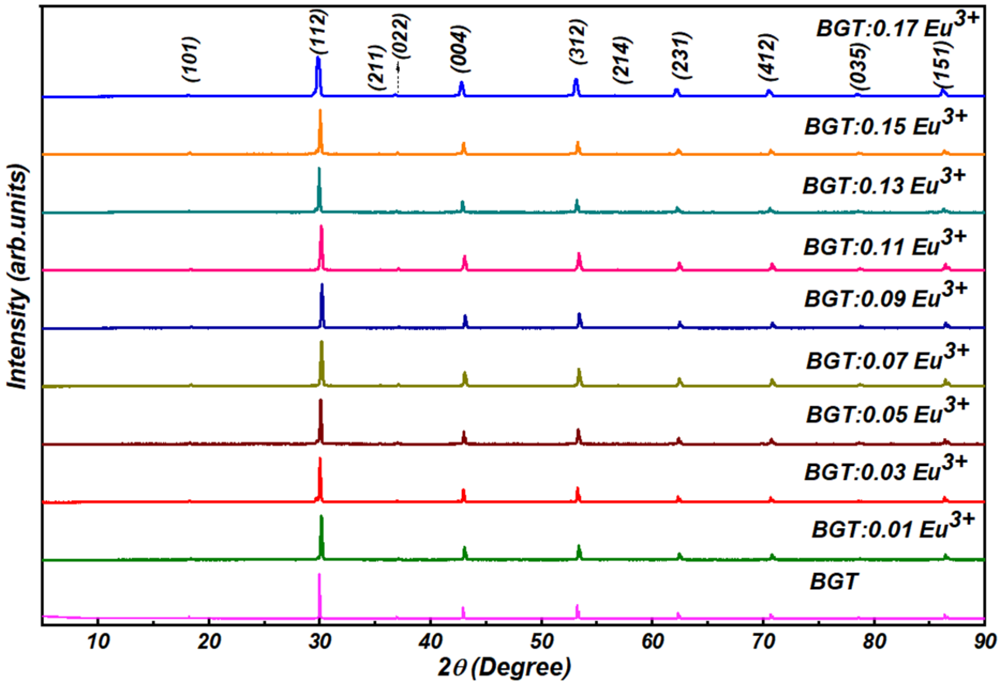

Fig. S1. *XRD patterns of BGT: xEu^{3+}(x=0-0.17) phosphor.*

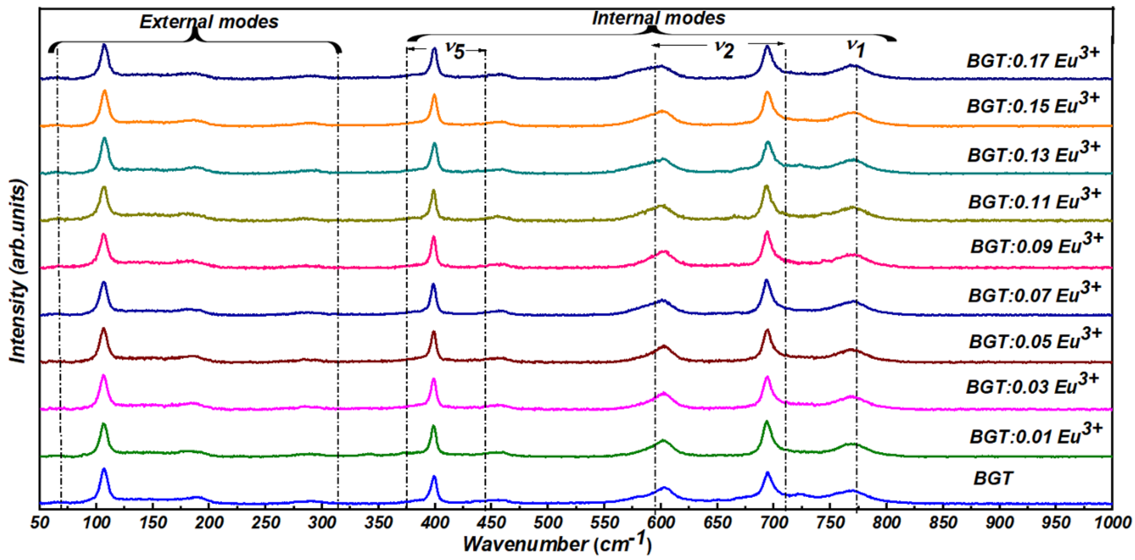

Fig. S2. *Micro Raman spectra of BGT: xEu^{3+}(0-0.17) phosphors.*

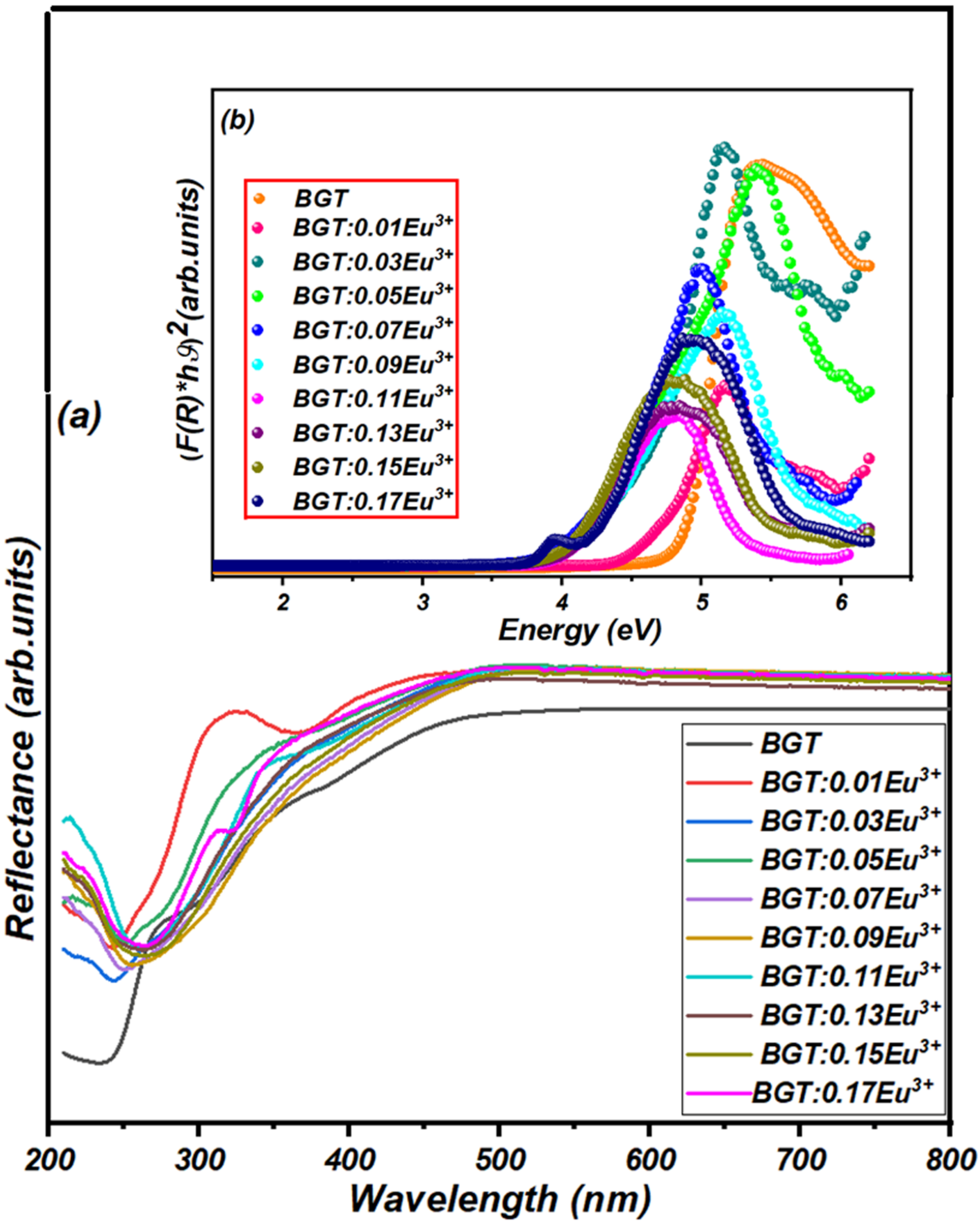

Fig. S3. *DRS spectra of BGT: xEu^{3+}(0-0.17) phosphors (Inset: Kubeka Munk plot).*

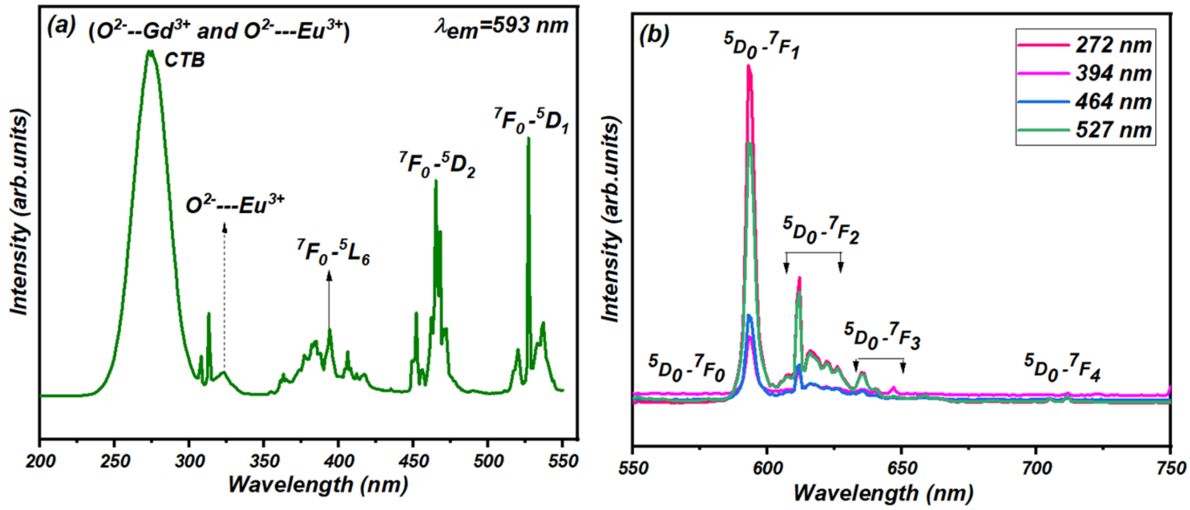

Fig. S4. *(a) Excitation and (b) emission spectra of BGT:0.11Eu^{3+} phosphor.*

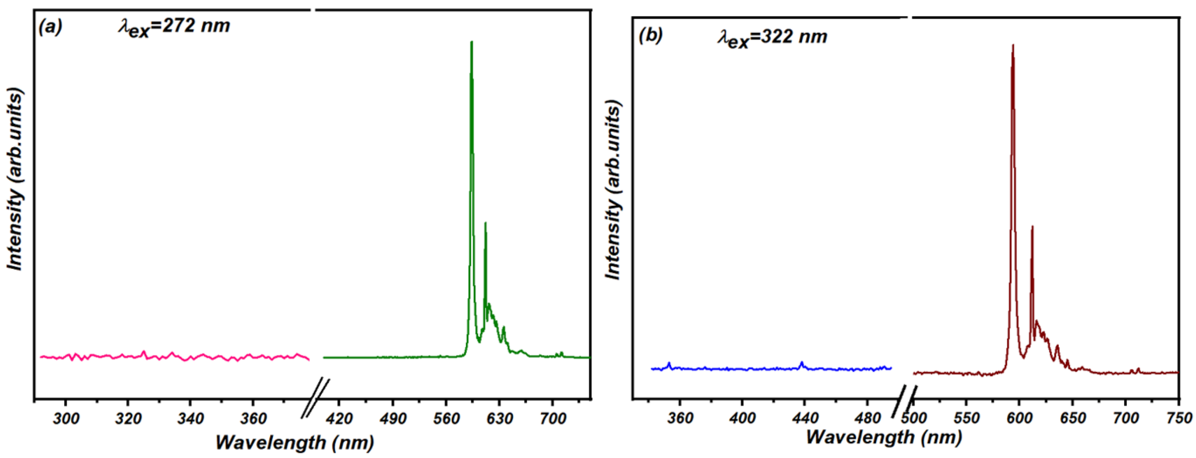

Fig. S5. *Emission spectra of BGT:0.17 Eu^{3+} phosphor under 272 nm and 322 nm excitation.*

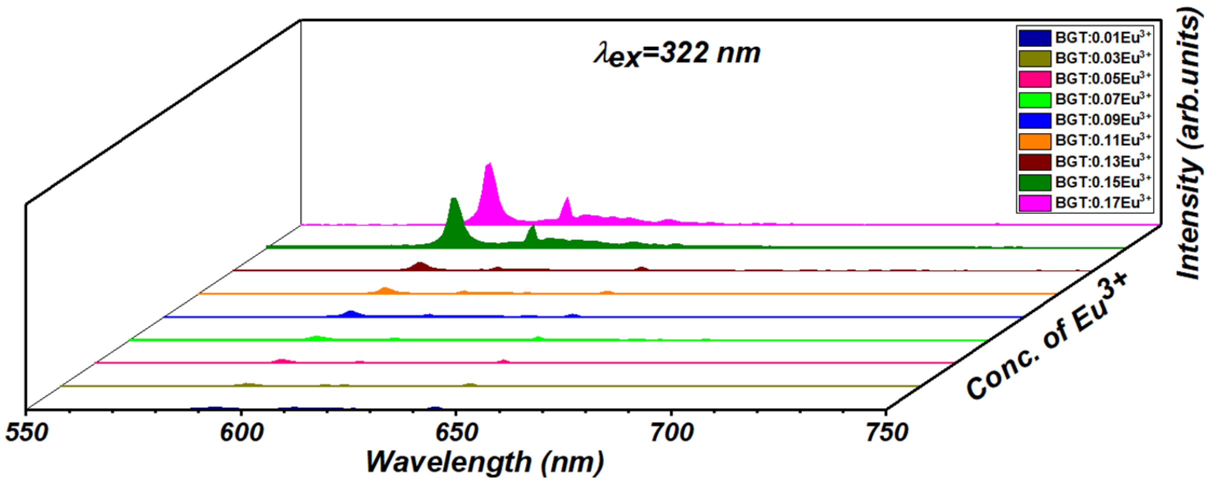

Fig. S6. *Emission spectra of BGT: xEu^{3+}(x=0.01-0.17) phosphors.*

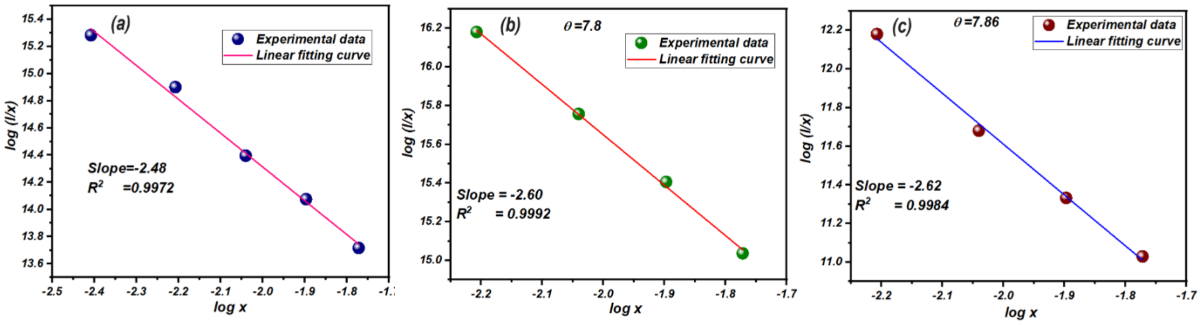

Fig. S7. *Experimental and corresponding linear fitting of log (I/x) versus log x plot of (b) 593 nm, (b) 614 nm and (c) 637 nm.*

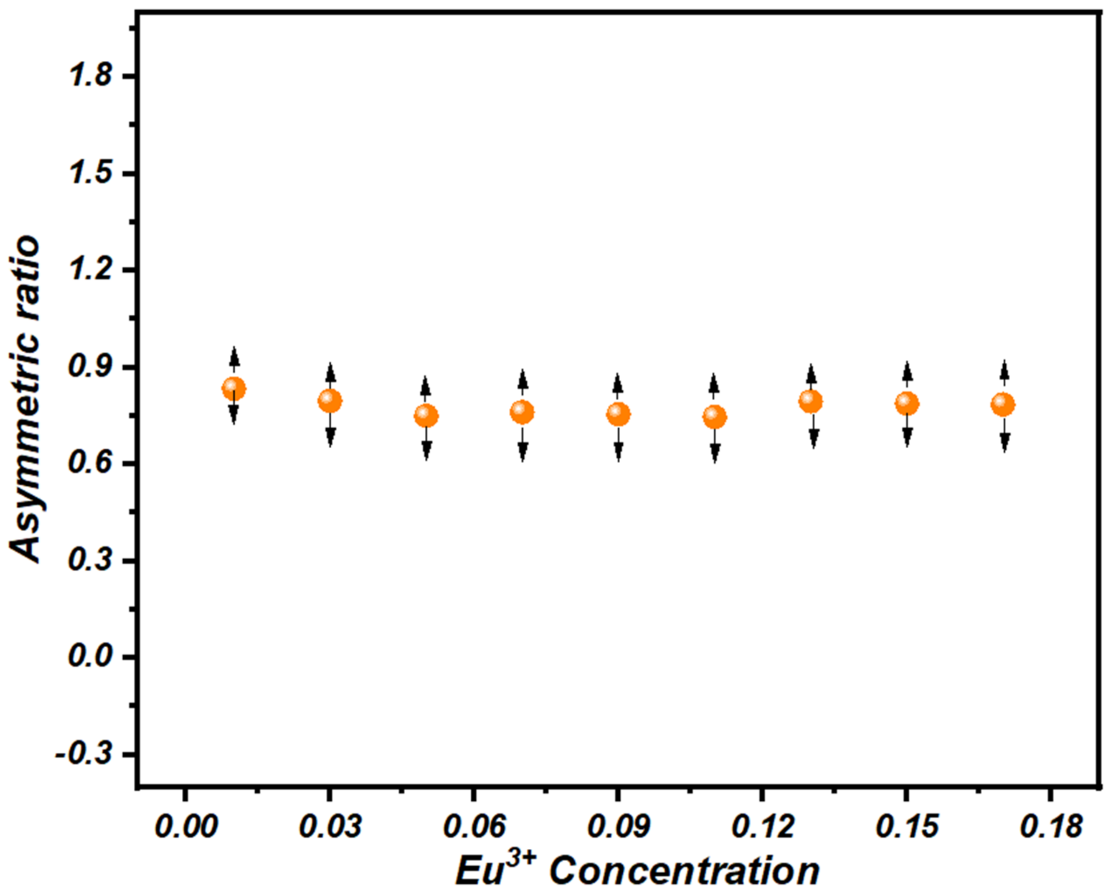

Fig. S8. *Asymmetric ratio of BGT: xEu^{3+}(x=0.01-0.17) phosphor.*

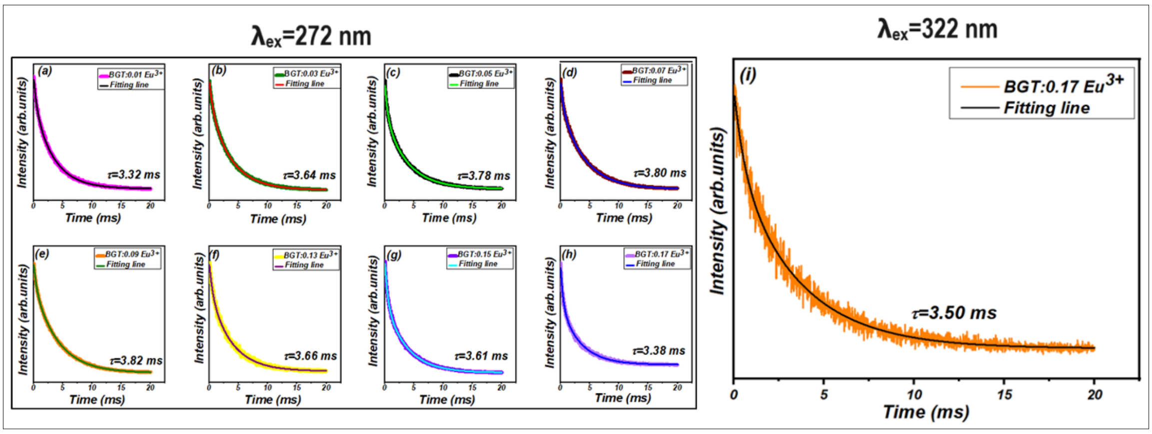

Fig. S9. *(a-i) Decay curve of Eu^{3+} doped BGT phosphor.*

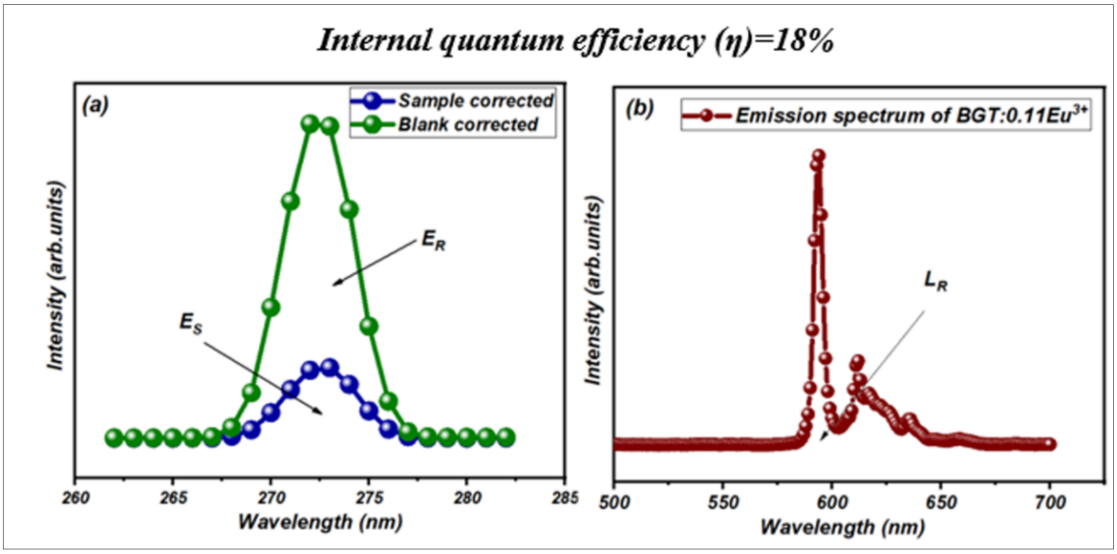

Fig. S10. *Emission spectrum of $BaSO_4$ and BGT:0.11Eu^{3+} phosphor collected by an integrating sphere.*

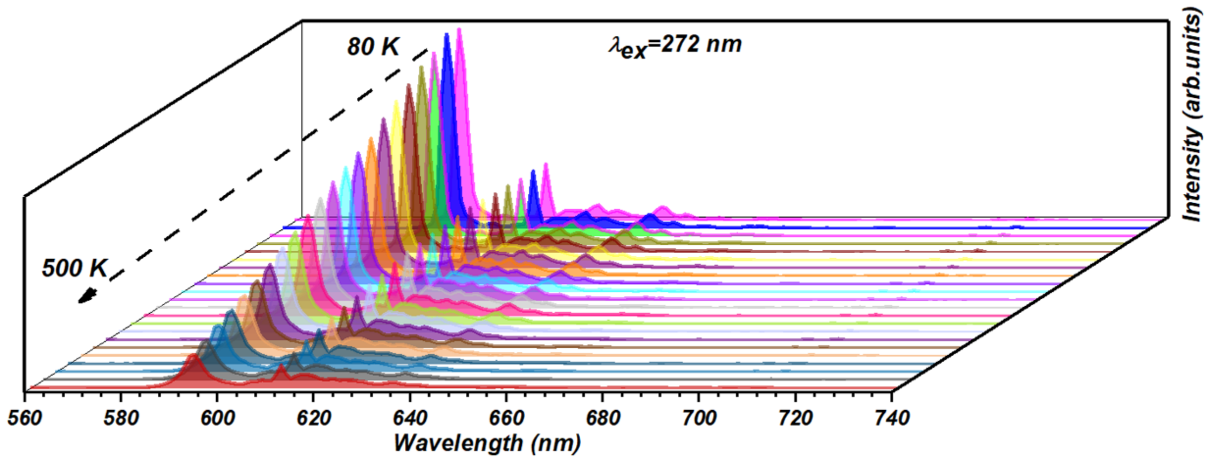

Fig.S11. *Temperature dependant emission spectra of BGT:0.11Eu^{3+} phosphor from 80-500 K.*

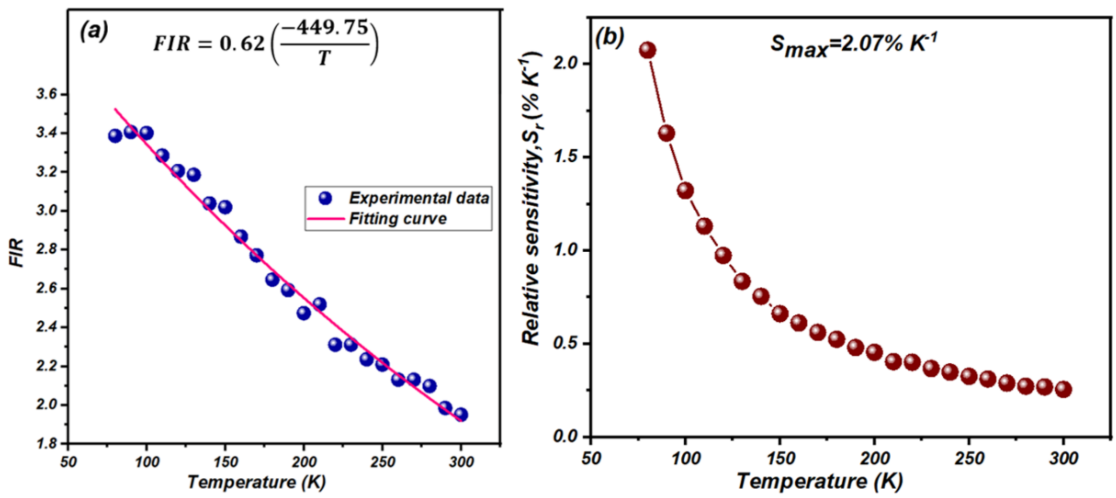

Fig. S12. *Low temperature dependency (a) FIR and (b) relative sensitivity of BGT:0.11Eu^{3+} phosphor.*

Table S1. *Lattice parameters and cell volume of BGT: xEu^{3+}(x=0-0.17) phosphors.*

Sample details	a (Å)	b (Å)	c (Å)	Cell volume (Å^3)
BGT	5.95	5.99	8.46	301.94
BGT:0.01Eu^{3+}	5.96	6.03	8.43	303.24
BGT:0.03Eu^{3+}	5.98	6.07	8.35	303.69
BGT:0.05Eu^{3+}	5.95	6.05	8.42	304.04
BGT:0.07Eu^{3+}	5.96	6.05	8.43	305.05
BGT:0.09Eu^{3+}	5.95	6.05	8.48	306.47
BGT:0.11Eu^{3+}	5.95	6.09	8.46	307.39
BGT:0.13Eu^{3+}	5.95	6.14	8.42	308.24
BGT:0.15Eu^{3+}	5.95	6.15	8.42	308.66
BGT:0.17Eu^{3+}	5.96	6.15	8.44	310.33

Table S2*. Refined crystallographic parameters of BGT:0.11 Eu^{3+} phosphor.*

Compound	$Ba_2Gd_{2/3}TeO_6$:0.11 Eu^{3+}
R_{exp} (%)	2.92
R_{wp} (%)	4.23
R_p (%)	3.21
GOF	1.45
Symmetry	Monoclinic
Space group	$P2_1/n$
a (Å)	5.95
b (Å)	6.09
c (Å)	8.47
β (°)	90.68
V (Å^3)	307.39

Table S3. *Relative sensitivity values of Eu^{3+} doped phosphors.*

Study	*Temperature range*	*Relative sensitivity %(K^{-1})*
$Ba_2Gd_{2/3}TeO_6:Eu^{3+}$ [Present work]	80-300 K 300-500 K	2.07 0.19
$ZnTiO_3:Mn^{4+},Eu^{3+}$[1]	80-310 K	2.5
$Sr_2GdSbO_6: Eu^{3+}$ [2]	283-433 K	0.27
$Ca_2InNbO_6:Eu^{3+}$[3]	303-483 K	0.365
$Sr_2GaNbO_6:0.018Eu^{3+}$[4]	298-623 K	1.86
$SrGdLiTeO_6:Eu^{3+}/Mn^{4+}$ [5]	300 – 550K	0.229
$CaLaMgTaO_6: Eu^{3+}/Bi^{3+}$[6]	393 – 573K	1.33
$La_2LiNbO_6:Bi^{3+}, Eu^{3+}$[7]	298 – 498 K	0.9
$NaLaMgWO_6: Mn^{4+}, Eu^{3+}$[8]	303–523 K	0.86
$Ba_2LaNbO_6: Mn^{4+}, Eu^{3+}$[9]	298–498 K	2.08
$SrY_2O_4:Bi^{3+}, Eu^{3+}$[10]	313–563 K	0.86
$La_2ZnTiO_6: Bi^{3+}, Eu^{3+}$[11]	293-473 K	1.23
$CsPbBr_3/EuPO_4$ nanocrystals@glass[12]	303 – 483K	1.80
$SrAl_2O_4:Eu^{2+/3+}$ [13]	298-473 K	1.6
$Mg_{28}Ge_{6.25}Ga_{1.2}O_{32}F_{15.04}:Eu^{2+},Mn^{4+}$[14]	303–473 K	1.38
$Lu_3Al_5O_{12}: Mn^{4+},Eu^{3+}$[15]	300-360 K	0.7
$Ba_2La_{2/3}TeO_6: Eu^{3]}$[16]	315 - 483 K	0.21
$Sr_2CdTeO_6: Eu^{3+}$[17]	300-500 K	0.28

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