Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supporting Information

$NaBiF_4$: Gd/Tb nanoscintillator for high-Resolution X-ray imaging

Manisha Bungla,[a,b] Mohit Tyagi,[c] Ashok K. Ganguli,[b,d*] and Paras N. Prasad[a*]

[a]Department of Chemistry and The Institute for Lasers, Photonics and Biophotonics, University at Buffalo (SUNY), 14260 Buffalo, NY, USA

[b]Department of Chemistry, Indian Institute of Technology Delhi, Hauz Khas, New Delhi 110016, India

[c]Technical Physics Division, Bhabha Atomic Research Centre, Trombay, Mumbai-400085, India

[d]Department of Chemical Sciences, Indian Institute of Science Education & Research, Berhampur, Laudigam, Odisha 760003, India

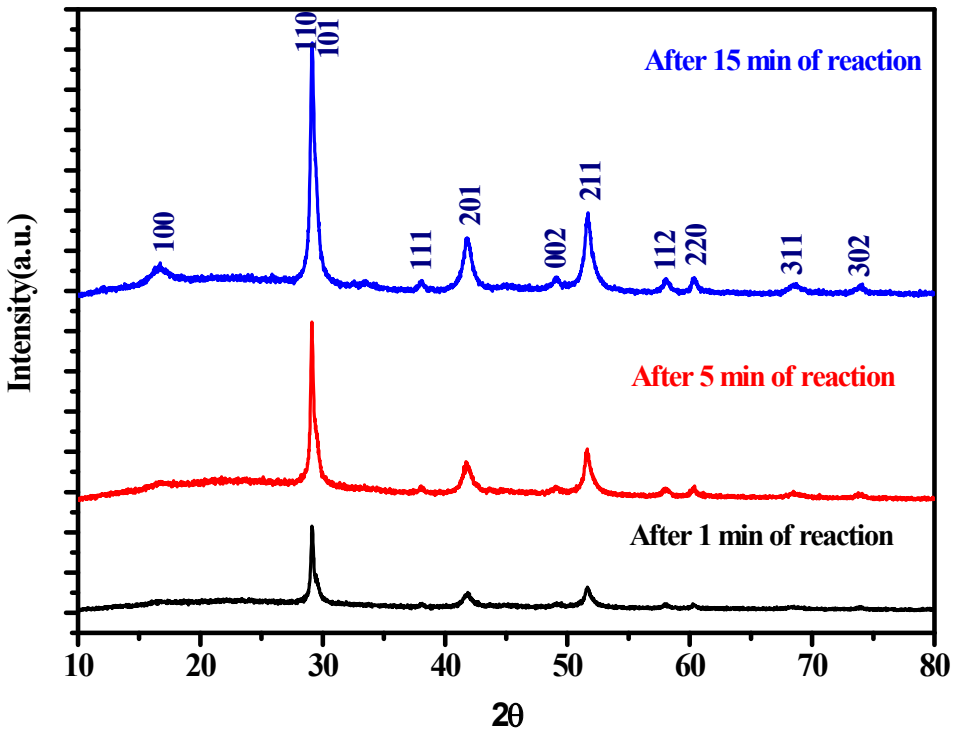

Figure S1: PXRD pattern showing the formation of $NaBiF_4$ immediately after 1 min, 5min and 15 min of reaction.

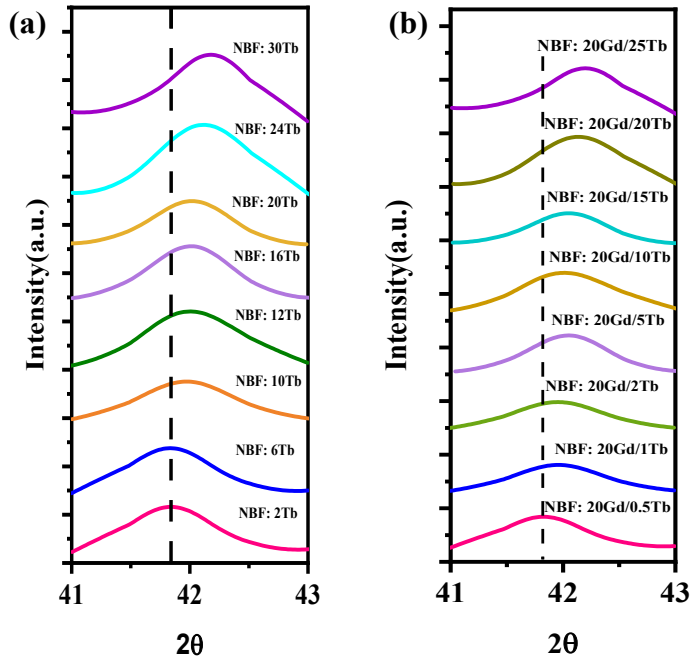

Figure S2. The magnified XRD patterns of the (201) peak.

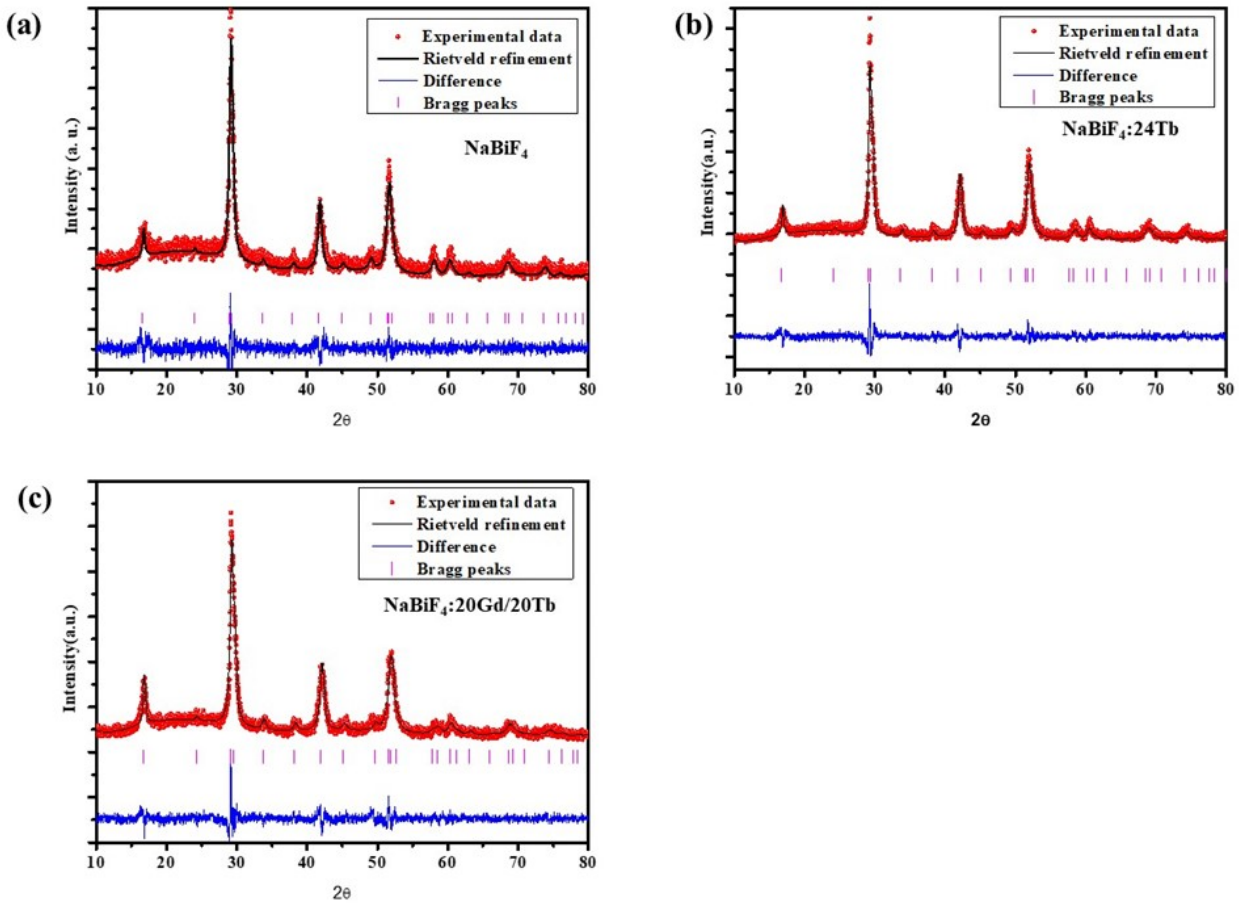

Figure S3. PXRD Rietveld refinement of (a) $NaBiF_4$, (b) $NaBiF_4$:24Tb and (c) $NaBiF_4$:20Gd/20Tb nanoparticles.

Table S1. Refined positional parameters for hexagonal $NaBiF_4$ nanoparticles after the final cycle of refinement.

	$NaBiF_4$	**$NaBiF_4$:24Tb**	**$NaBiF_4$:20Gd/20Tb**
Crystal Structure	Hexagonal		
Space Group	$P\bar{6}$		
a(Å)	6.1556(16)	6.1428(11)	6.1330(13)
c(Å)	3.7195(12)	3.69079(83)	3.6749(11)
R_{exp}(%)	10.77	10.02	8.77
R_p(%)	9.47	9.47	8.51
R_{wp}	12.01	11.91	10.78
GOF(S)	1.12	1.19	1.23

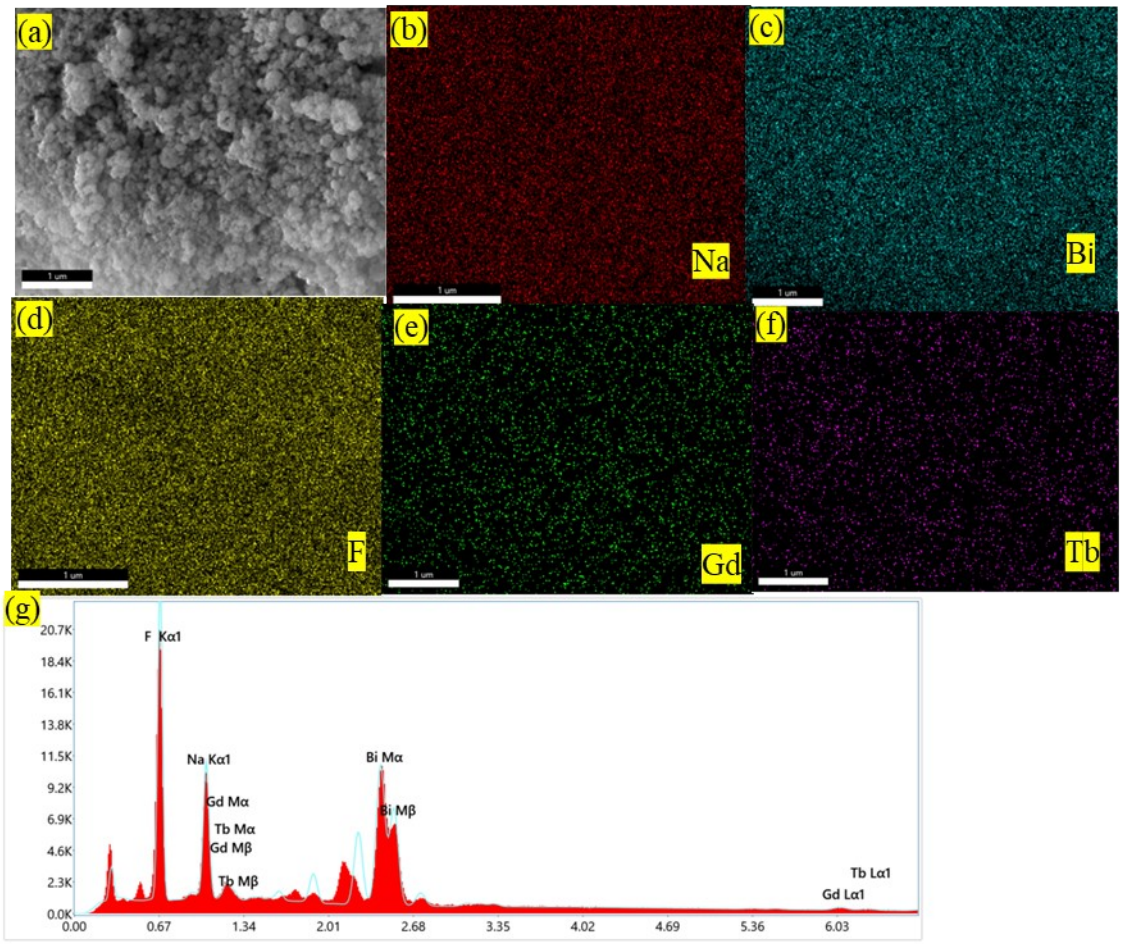

Figure S4. Elemental mapping results (a-f) of $NaBiF_4$: 20Gd/20Tb NPs (g) EDX spectrum

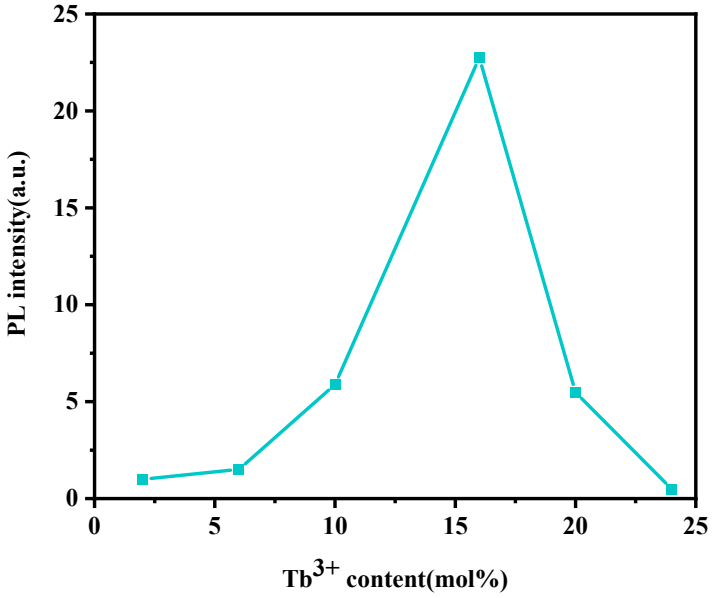

Figure S5. Integrated PL intensity profiles at various Tb^{3+} doping contents.

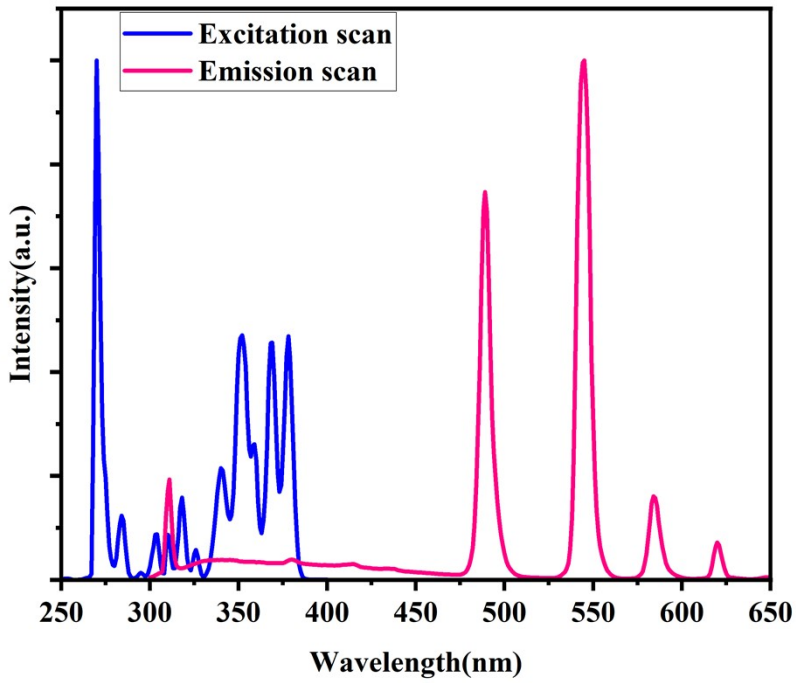

Figure S6. PLE and PL spectra of NBF: Gd, Tb nanoparticles.

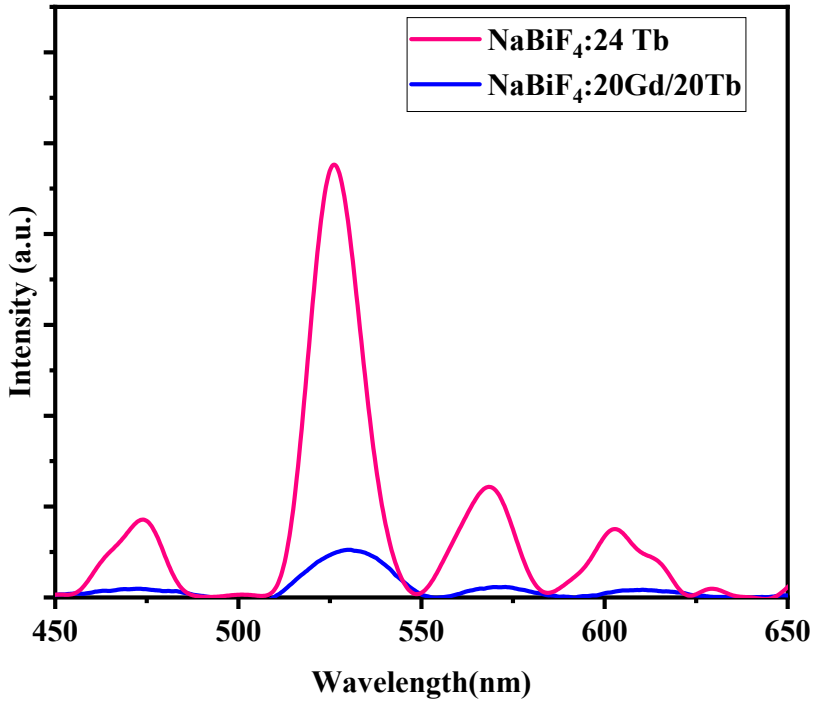

Figure S7. Afterglow spectra of the $NaBiF_4$:20Gd/20Tb and $NaBiF_4$:24Tb NPs recorded after cessation of X-ray irradiation immediately.

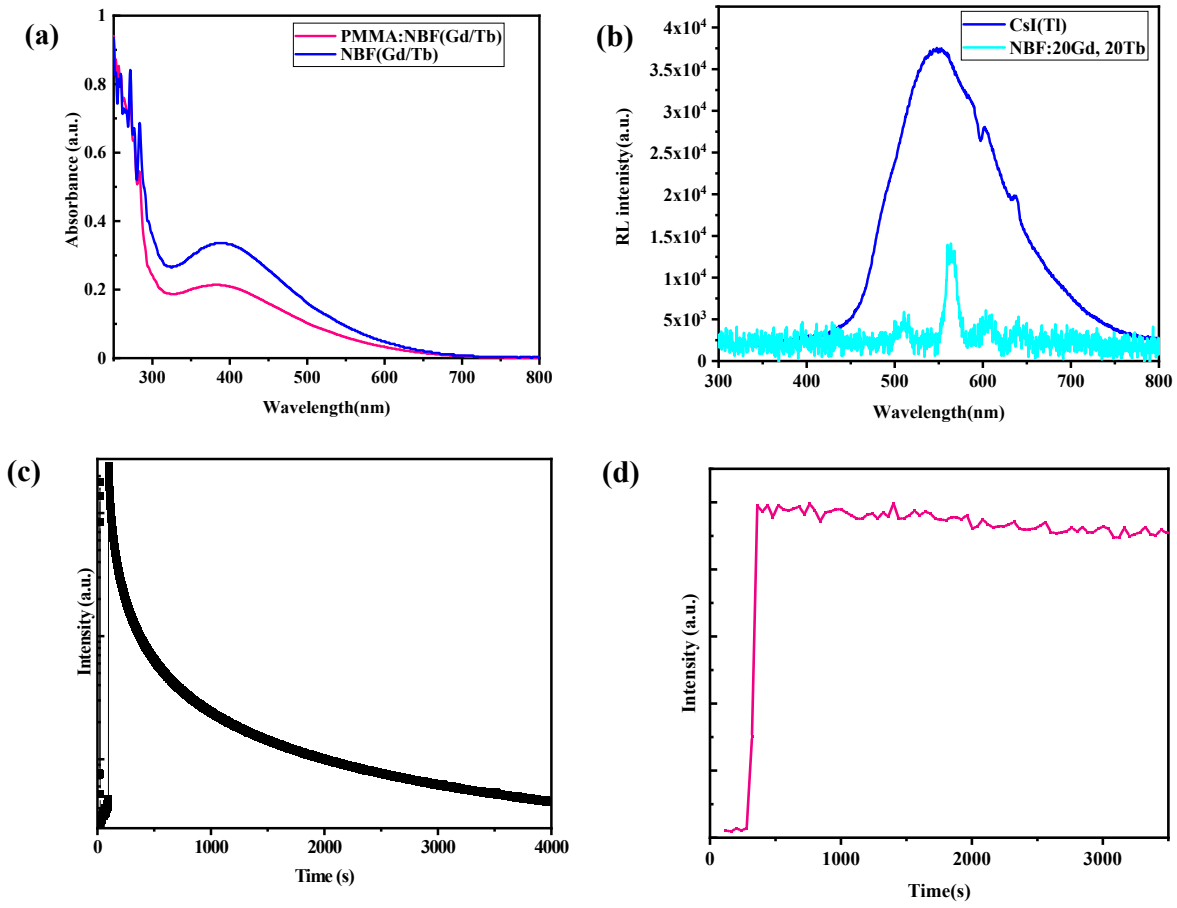

Figure S8. (a) Absorption spectra of PMMA-NBF film and NBF:20Gd, 20Tb(b) XEOL emission spectra of the NBF: 20Gd/20Tb NPs and the commercial CsI (Tl) single crystal, (c) Persistent luminescence decay curve of NBF: 20Gd/20Tb samples for 60 min after switching off X-ray (d) Radioluminescence stability of NBF: 20Gd/20Tb powder samples under continuous X-ray irradiation for 60 min.

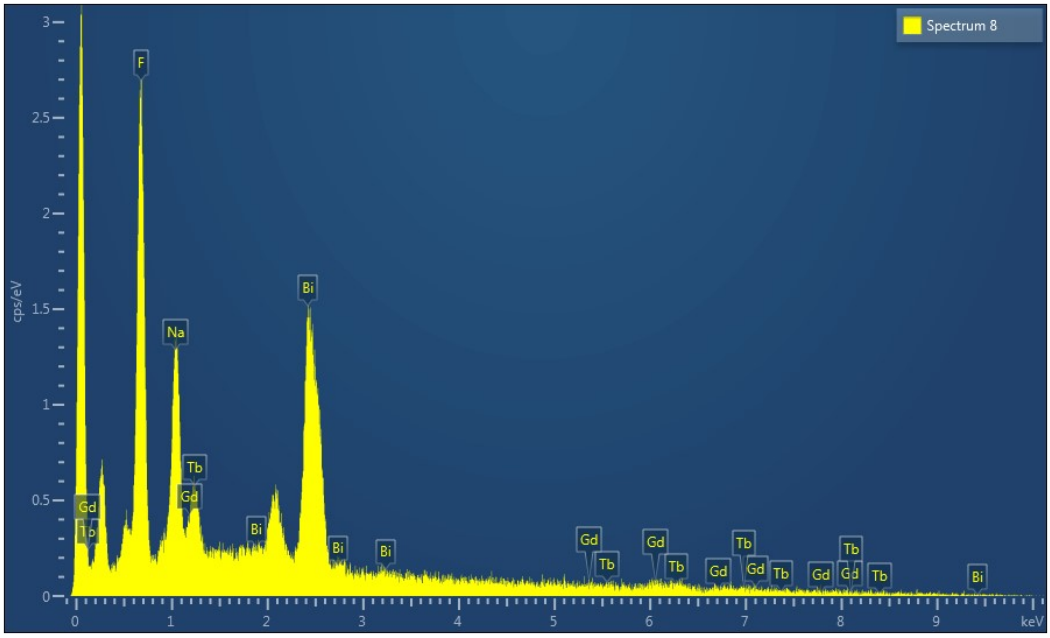

Figure S9. EDX spectrum of PMMA: NBF (Gd, Tb) composite films.

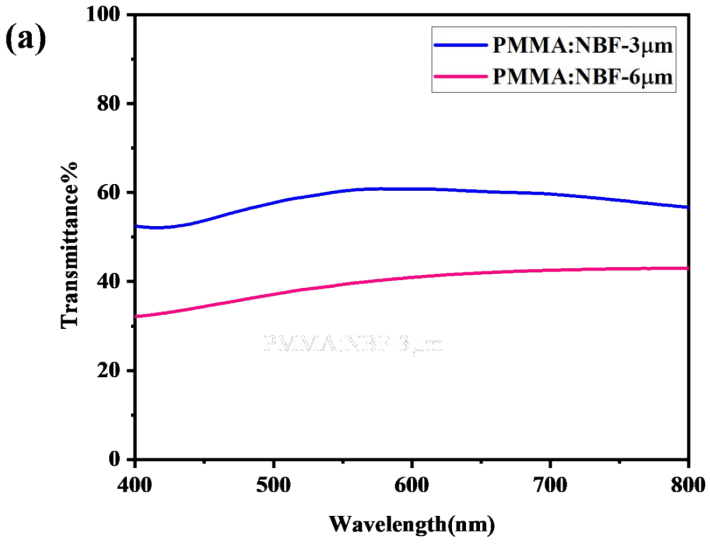

Figure S10. (a) Transmittance spectra of the prepared films with different thickness, 3 and 6 µm. (b) XEOL images formed of a duplex wire with the utilization of the PMMA: NBF nanoscintillator films with different thickness, 3 and 6 µm.

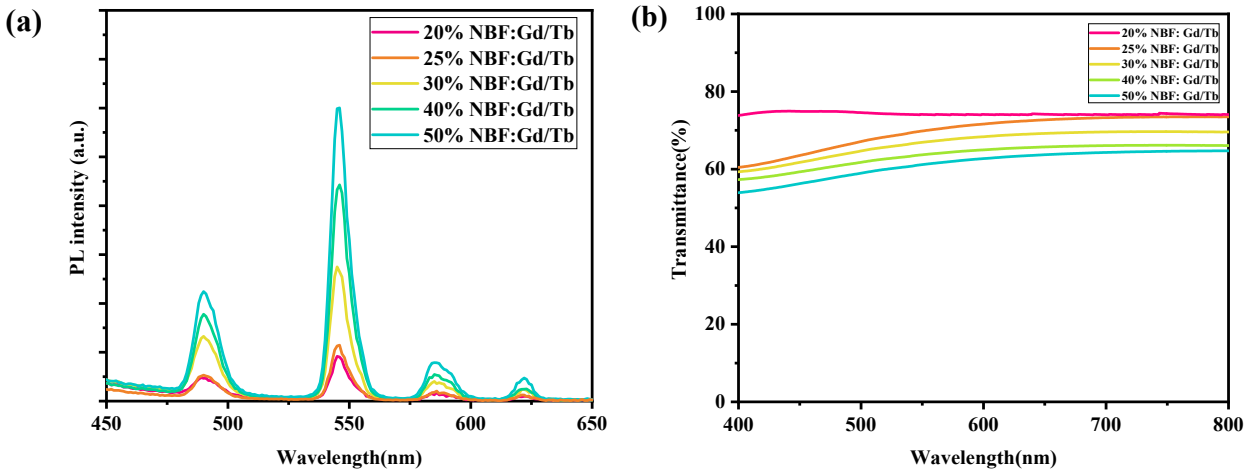

Figure S11. (a) PL spectra and (b) transmission spectra of PMMA-NBF film with different loading percentages.

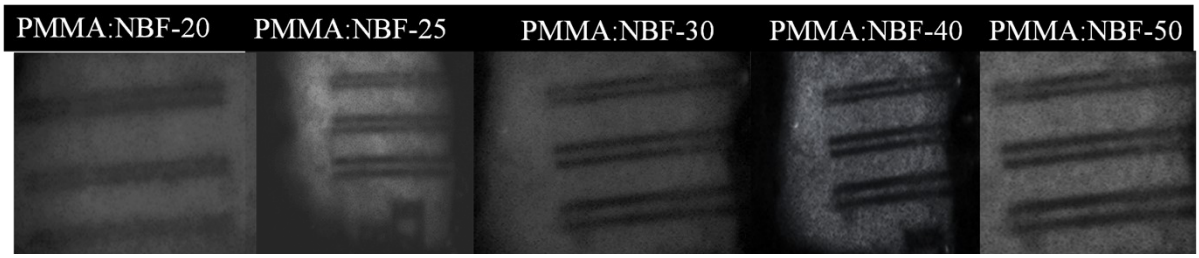

Figure S12. XEOL images of a duplex wire with the utilization of the PMMA: NBF composite films of loading 20%, 25%, 30%, 40% and 50%.