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Supporting information

Influence of Na^+ ion doping on the phase change and upconversion emissions of the GdF_3: Yb^{3+}, Tm^{3+} nanocrystals obtained from the designed molecular precursors

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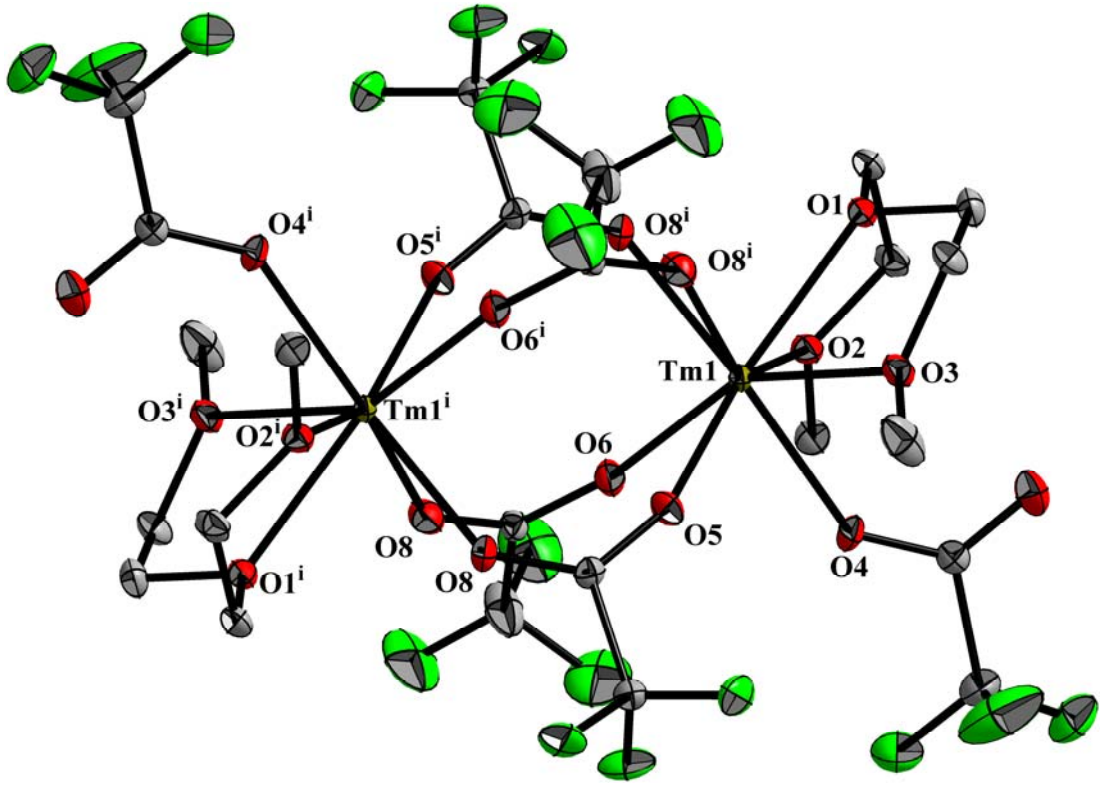

Fig. S1 Perspective view of [$Tm_2(TFA)_6(diglyme)_2$] (**2**). H-atoms on diglyme ligand have been omitted for clarity. Selected bond lengths (Å) and angles (°): Tm1—O9 2.434 (5), Tm1—$O27^i$ 2.315 (5), Tm1—O11 2.267 (4), Tm1—$O13^i$ 2.310 (5), Tm1—O18 2.236 (4), Tm1—O2 2.383 (4), Tm1—O25 2.260 (5), Tm1—O5 2.439 (5), $O27^i$—Tm1—$O13^i$ 72.42 (18), O2—Tm1—O18 106.92 (16), O2—Tm1—O5 67.24 (15), O5—Tm1—O18 76.11 (17), O2—Tm1—O9 66.05 (16), O9—Tm1—O18 74.04 (17), O5—Tm1—O9 112.43 (16), O2—Tm1—O18 106.92 (16), O2—Tm1—O11 144.56 (17), O2—Tm1—O25 138.44 (17), O5—Tm1—O11 144.74 (16), O5—Tm1—O25 76.50 (16), O9—Tm1—O11 82.62 (17), O9—Tm1—O25 151.28 (17), O11—Tm1—O25 76.59 (18), O11—Tm1—O18 78.12 (17). Symmetry code: (i) -*x*, -*y*+1, -*z*+1

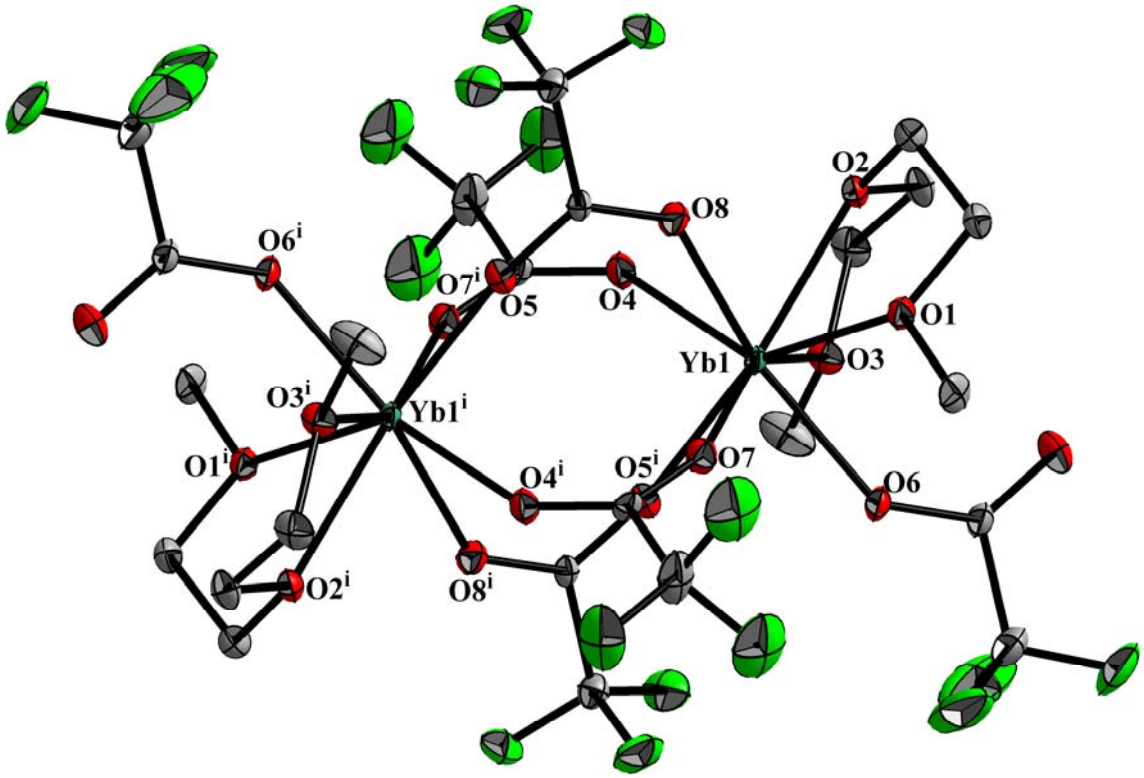

Fig. S2 Perspective view of [$Yb_2(TFA)_6(diglyme)_2$] (**3**). H-atoms on diglyme ligand have been omitted for clarity. Selected bond lengths (Å) and angles (°): Yb1—$O4^i$ 2.307 (5), Yb1—O25 2.430 (4), $Yb1^i$—$O11^i$ 2.258 (5), Yb1—O28 2.226 (4), Yb1—O19 2.430 (5), $O4^i$—$Yb1^i$—$O11^i$ 77.56 (17), O2—Yb1—O22 144.44 (17), O2—Yb1—O9 74.69 (18), O9—Yb1—O22 79.63 (16), $O4^i$—Yb1—O19 76.08 (17), O2—Yb1—O25 82.68 (17), $O11^i$—Yb1—O19 76.33 (17), O9—Yb1—O25 71.95 (17), O2—Yb1—O19 144.79 (17), O2—Yb1—O28 78.06 (18), O9—Yb1—O19 139.38 (17), O9—Yb1—O28 138.48 (18). Symmetry code: (i) -*x*, -*y*+1, -*z*+2.

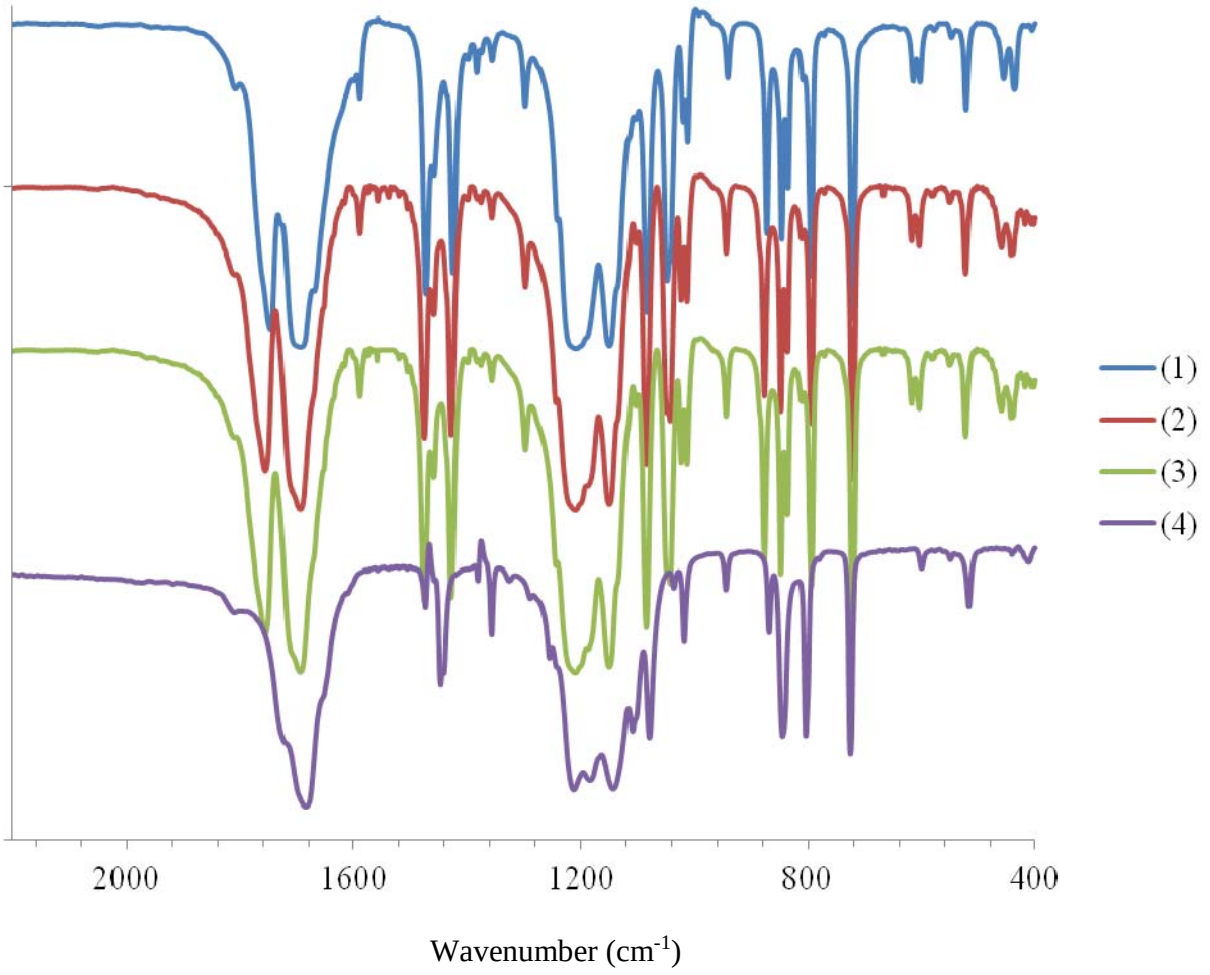

Fig. S3 FT-IR spectra of (**1**)-(**4**) measured as nujol mulls.

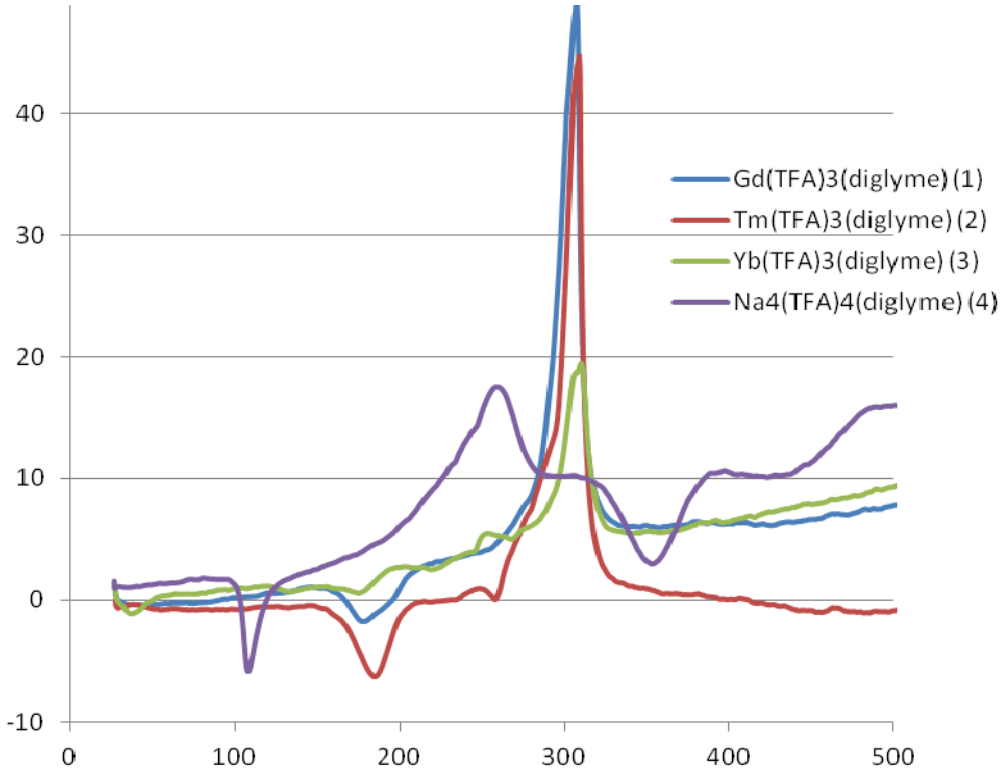

Fig. S4 DTA curves of **1-4.**

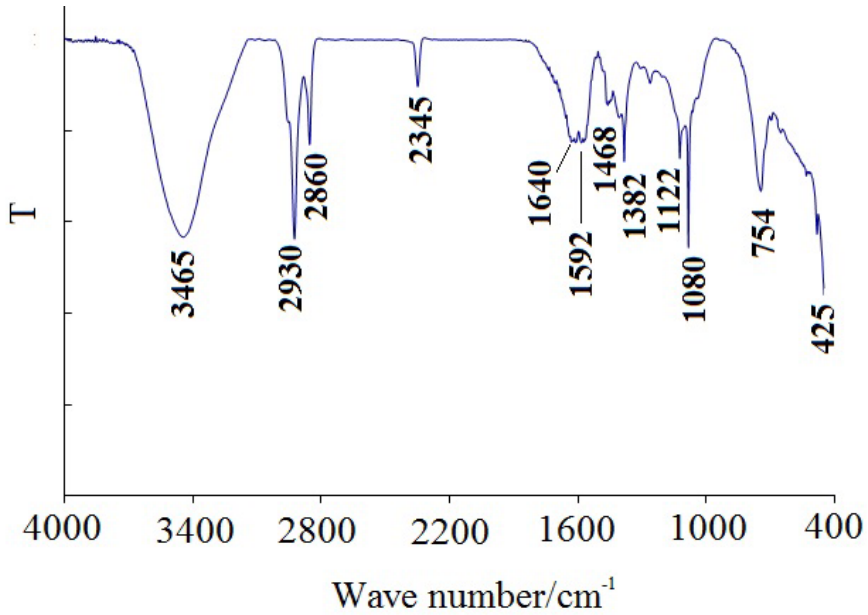

Fig. S5 IR spectrum of as-prepared GdF_3:Yb^{3+}, Tm^{3+} NCs**.**

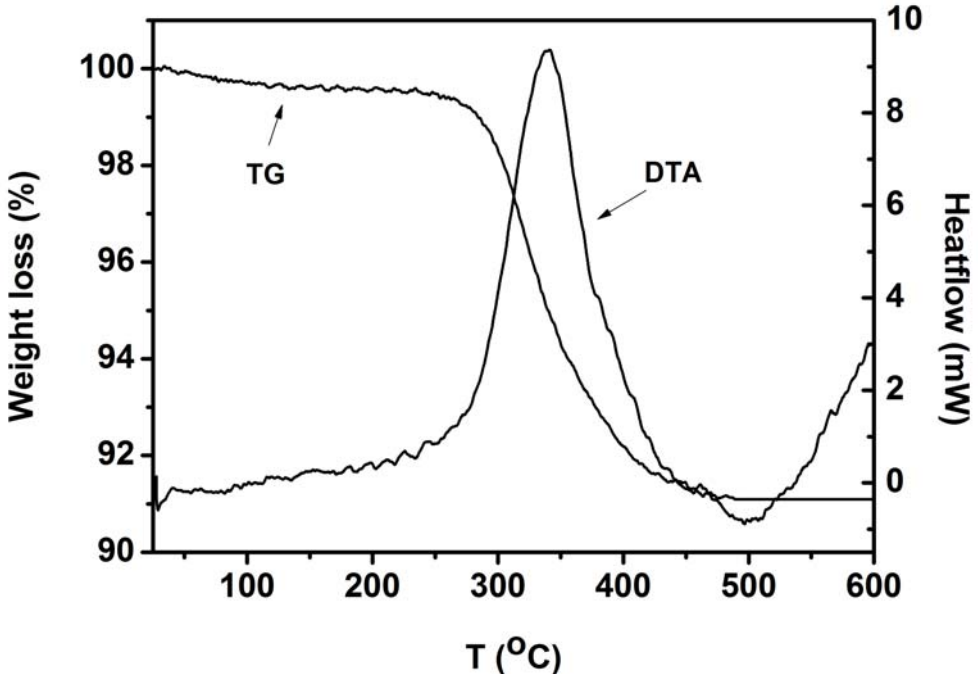

Fig. S6 TG-DTA curves of as-prepared GdF_3:Yb^{3+}, Tm^{3+} NCs**.**

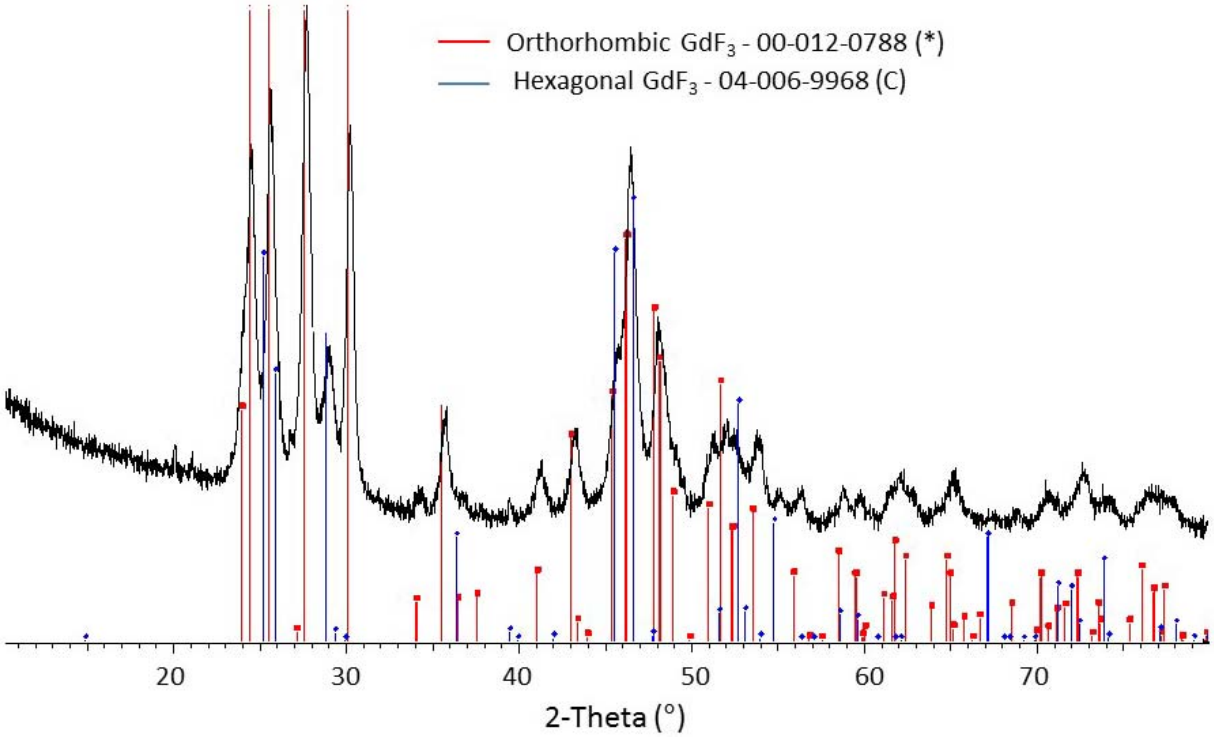

Fig. S7 XRD of GdF_3: 20% Yb^{3+}, 2% Tm^{3+} , 20 mol% Na^{+} NCs**.**

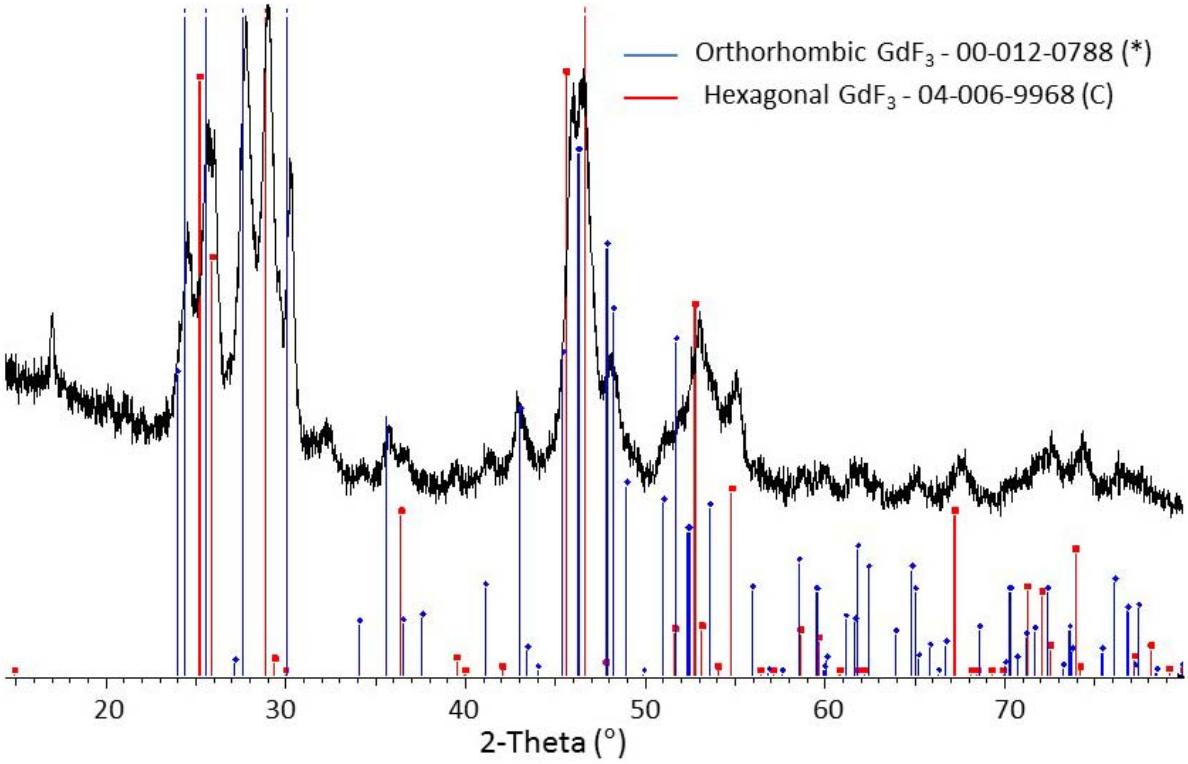

Fig. S8 XRD of GdF_3: 20% Yb^{3+}, 2% Tm^{3+} , 30 mol% Na^+ NCs**.**

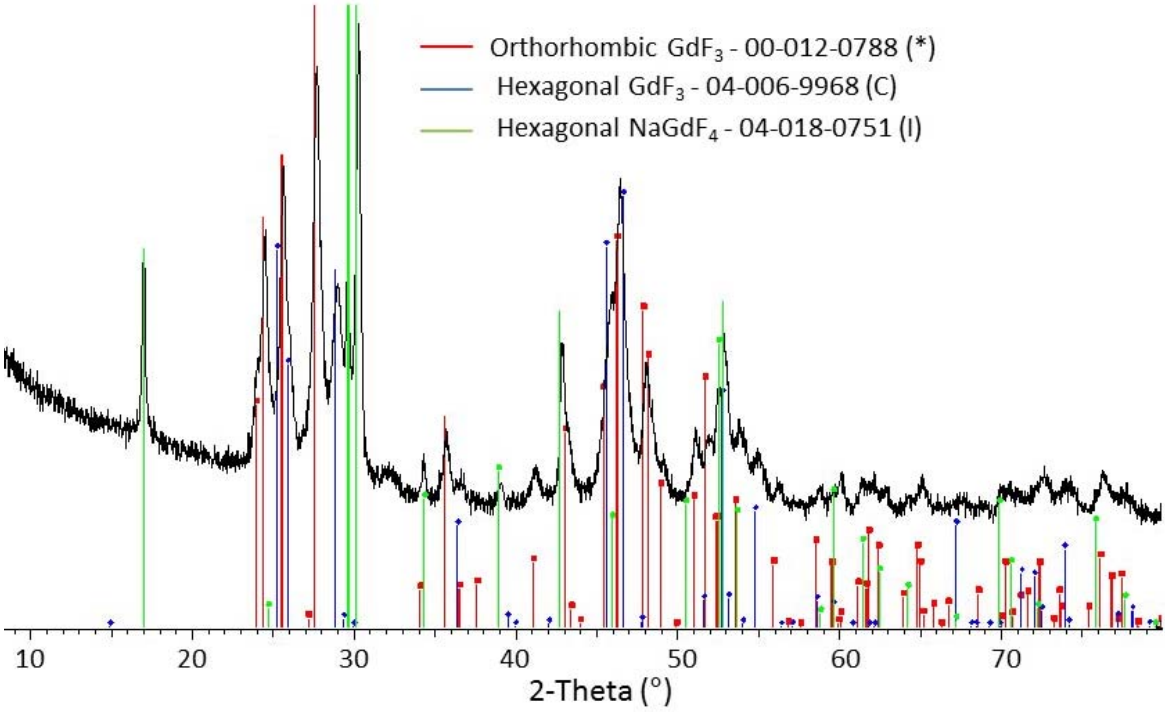

Fig. S9 XRD of GdF_3: 20% Yb^{3+}, 2% Tm^{3+} , 40 mol% Na^+ NCs**.**

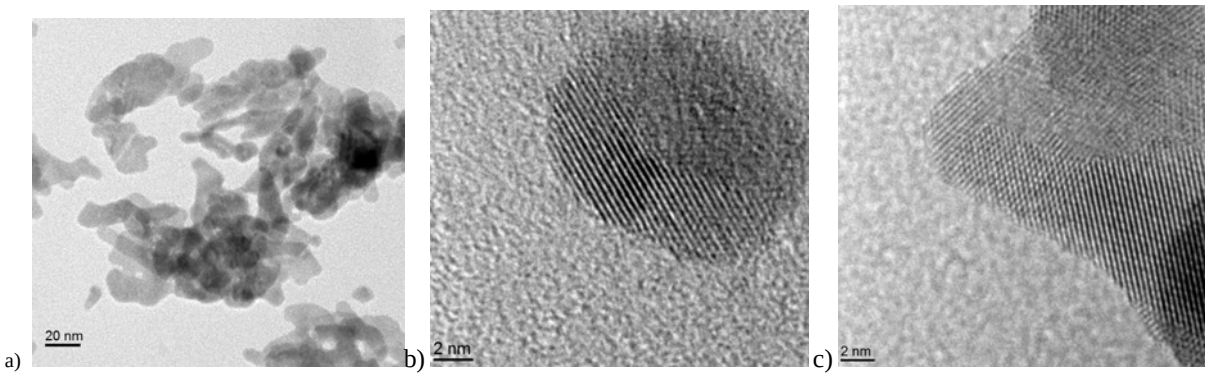

Fig. S10 TEM and HR-TEM images of as-prepared GdF_3:Yb^{3+}, Tm^{3+} NCs**.**

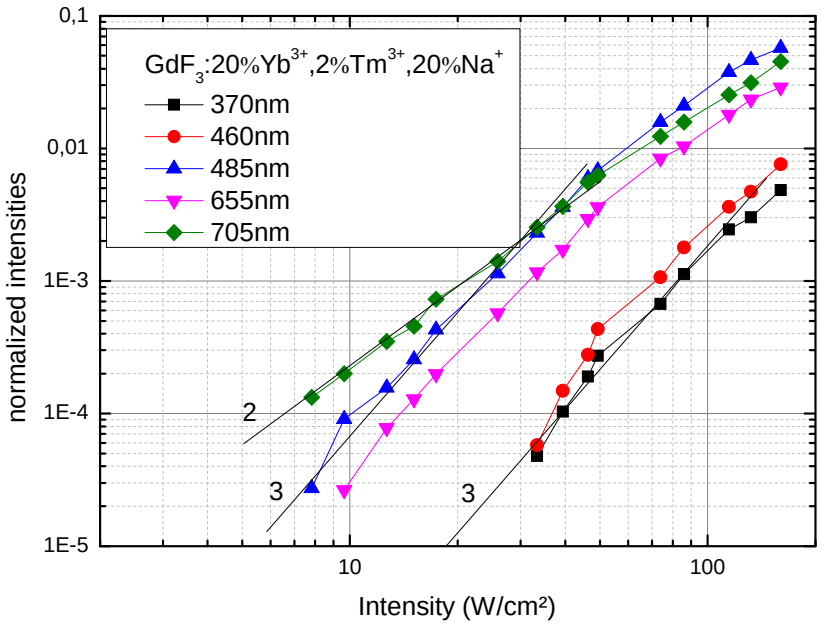

Fig. S11 Evolution of the intensity of the different bands of GdF_3: 20% Yb^{3+}, 2% Tm^{3+} , 20% Na^+ NCs with the fluence**.**

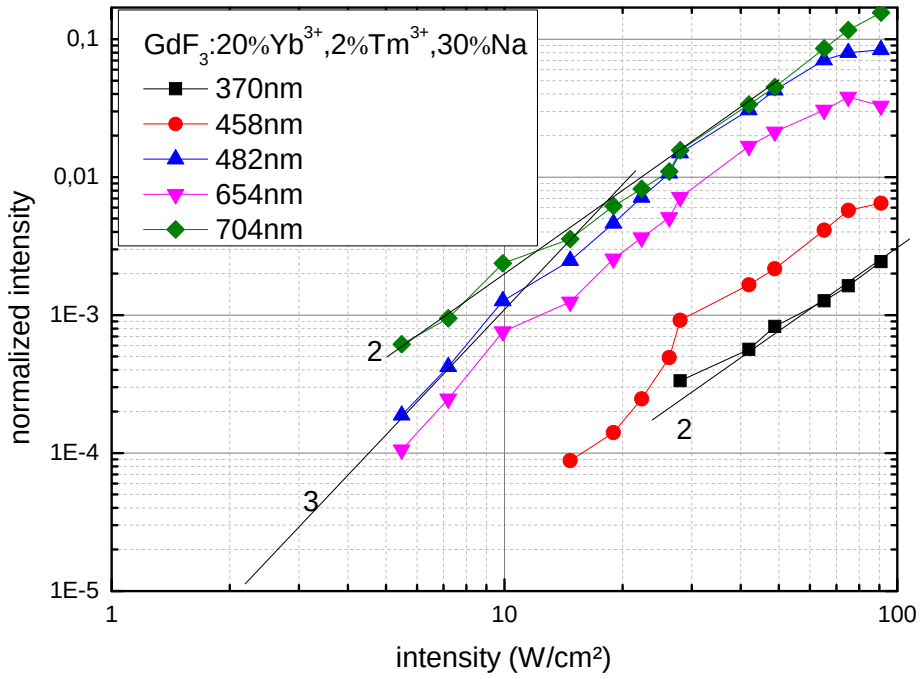

Fig. S12 Evolution of the intensity of the different bands of GdF_3: 20% Yb^{3+}, 2% Tm^{3+} , 30% Na^+ NCs with the fluence**.**

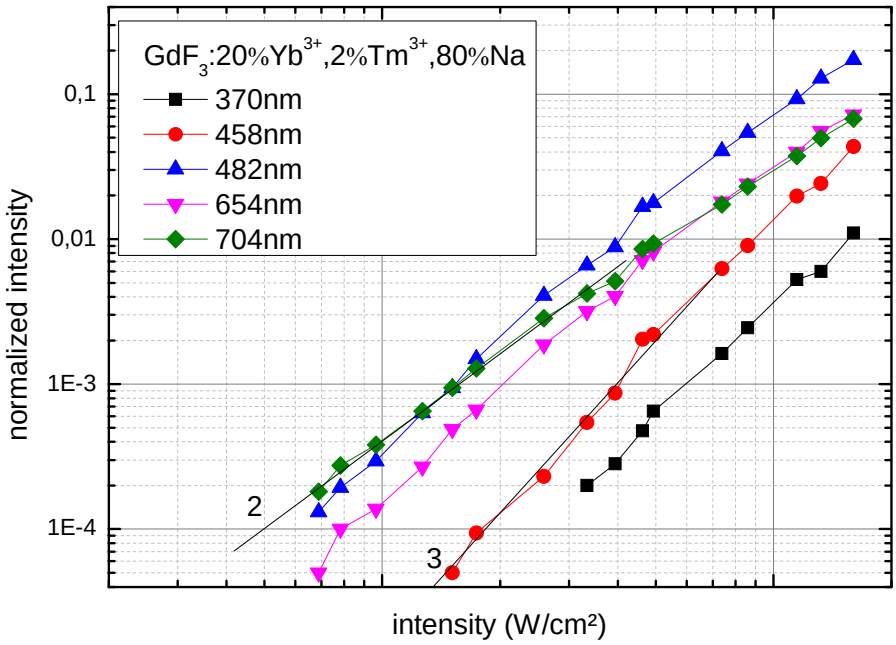

Fig. S13 Evolution of the intensity of the different bands of GdF_3: 20% Yb^{3+}, 2% Tm^{3+} , 80% Na^+ NCs with the fluence**.**

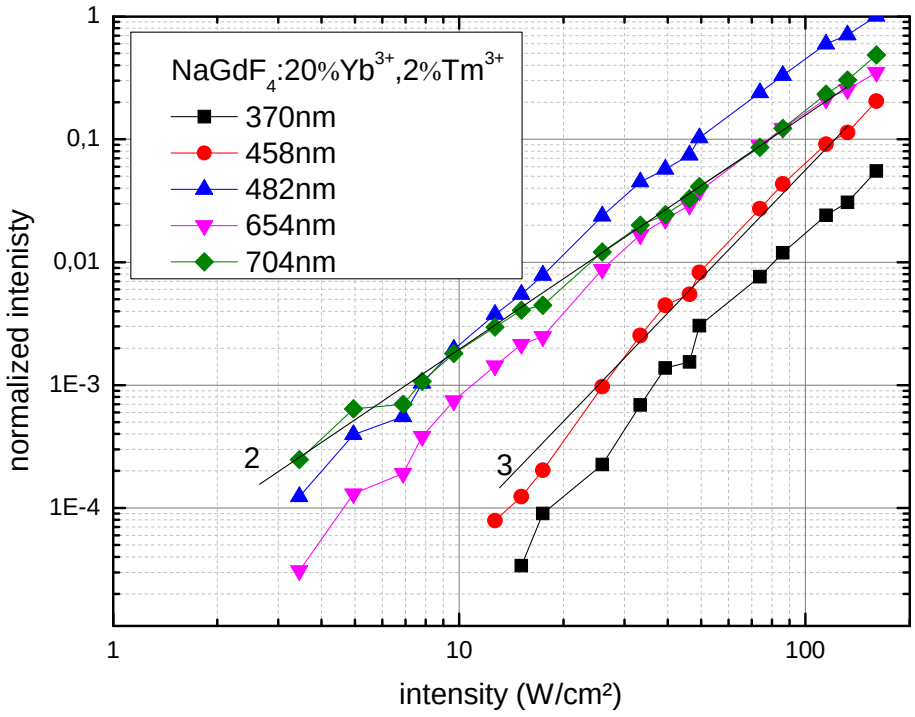

Fig. S14 Evolution of the intensity of the different bands of $NaGdF_4$: 20% Yb^{3+}, 2% Tm^{3+} NCs with the fluence**.**