Electronic Supplementary Material (ESI) for Inorganic Chemistry Frontiers.

Supporting Information

In-situ epitaxial growth of GdF_3 on $NaGdF_4$:Yb,Er nanoparticles

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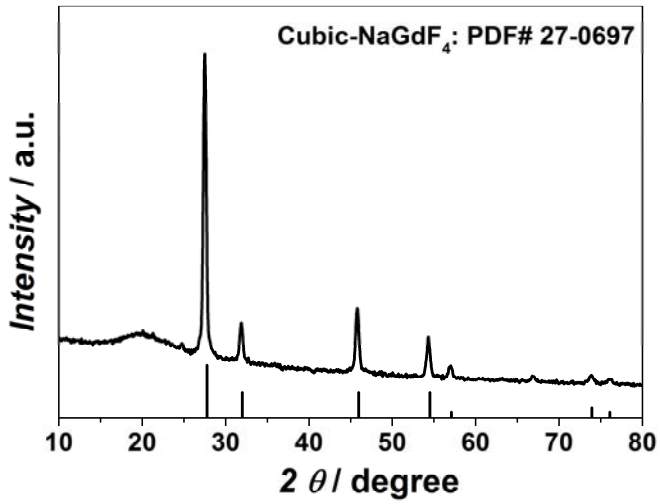

Fig. S1 Powder X-ray diffraction pattern of cubic-$NaGdF_4$:Yb,Er. The black bar is the standard index from JCPDS card: 27-0697.

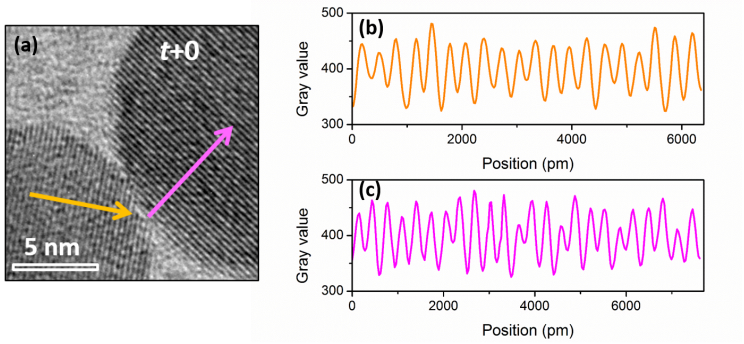

Fig. S2 (a) HRTEM image at the interface of two adjacent $NaGdF_4$ particles. (b) and (c) Profiles of line scans indicated by the orange arrow and the pink one in (a). The crystal fringe in both keeps constant as 3.17 Å, corresponding to the cubic-$NaGdF_4$ (111) plane.

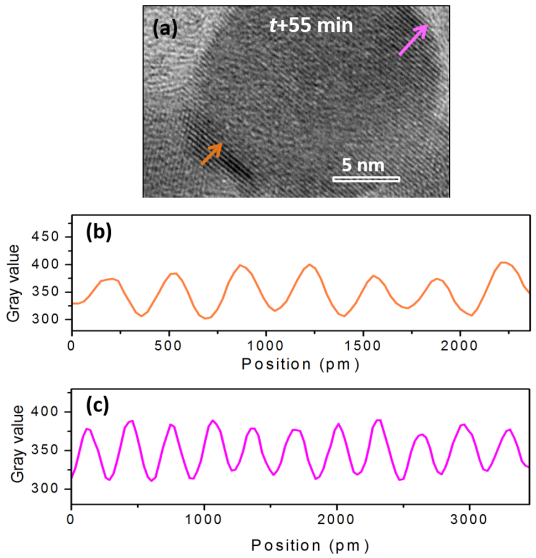

Fig S3. (a) HRTEM image at the interface with t = 55 min to show precisely the epitaxial growth of GdF_3. (b) and (c) Profiles of line scans indicated by the orange arrow and the pink one in (a). The d-spacing is 3.43 Å for (b) and 3.17 Å for (c).

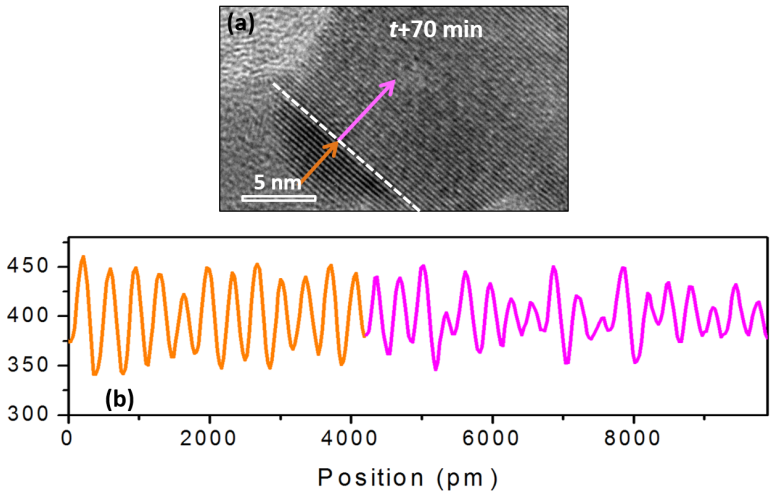

Fig. S4 (a) HRTEM image at the interface with t = 70 min to show the increasing epitaxial growth of GdF_3. A crystal interface between GdF_3 and $NaGdF_4$ was observed as indicated by a white dash line. (b) Profile of line scan indicated by the orange arrow and the pink one in (a). The d-spacing shrinks from 3.43 Å for the orange arrow to 3.17 Å for the pink one.

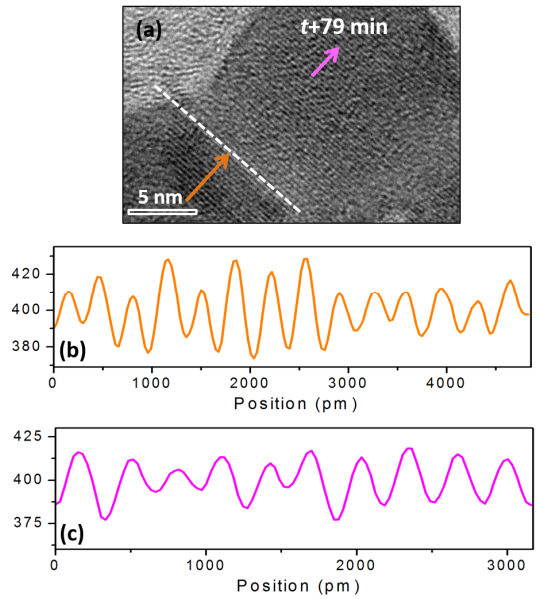

Fig. S5 (a) HRTEM image at the interface with t = 79 min to show the increasing epitaxial growth of GdF_3. A crystal interface between GdF_3 and $NaGdF_4$ was observed as indicated by a white dash line. (b) and (c) Profiles of line scan indicated by the orange arrow and the pink one in (a).

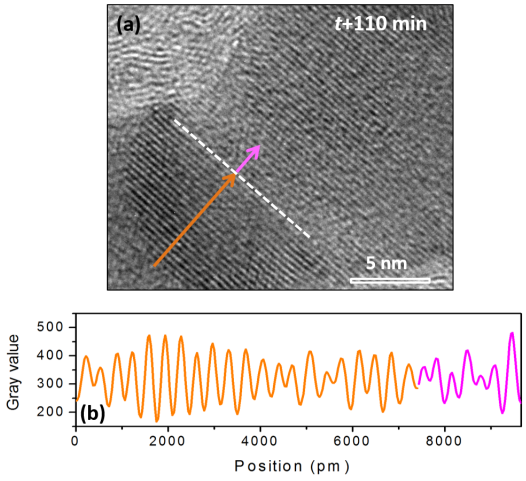

Fig. S6 (a) HRTEM image at the interface with t = 110 min to show the increasing epitaxial growth of GdF_3. A crystal interface between GdF_3 and $NaGdF_4$ was observed as indicated by a white dash line. (b) Profile of line scan indicated by the orange arrow and the pink one in (a). The d-spacing shrinks from 3.43 Å for the orange arrow to 3.17 Å for the pink one.

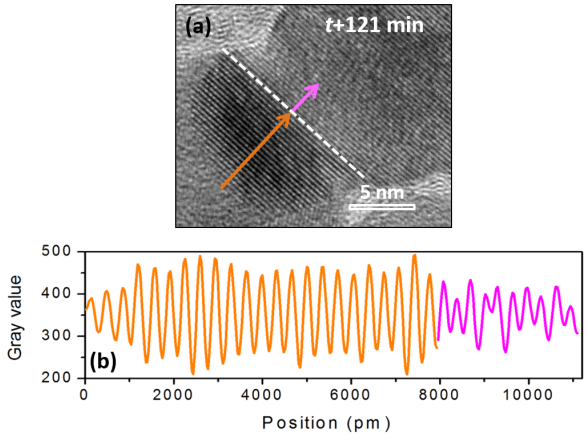

Fig. S7 (a) HRTEM image at the interface with t = 121 min to show the increasing epitaxial growth of GdF_3. A crystal interface between GdF_3 and $NaGdF_4$ was observed as indicated by a white dash line. (b) Profile of line scan indicated by the orange arrow and the pink one in (a). The d-spacing shrinks from 3.43 Å for the orange arrow to 3.17 Å for the pink one.

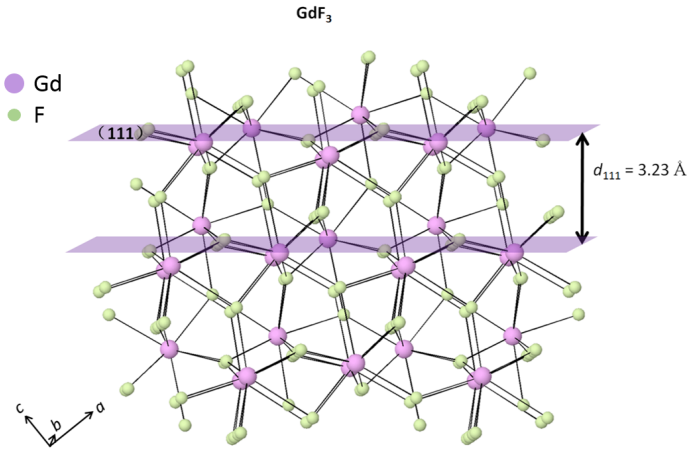

Fig. S8 (a) Crystal structure for GdF_3 adopting orthorhombic symmetry with stacking pattern of (111) plane. Gd atoms are indicated as purple spheres and F atoms as green ones.