

**Evidences of thermal ionization induced luminescence quenching in CePO₄
and GdPO₄[†]
(Supplementary information)**

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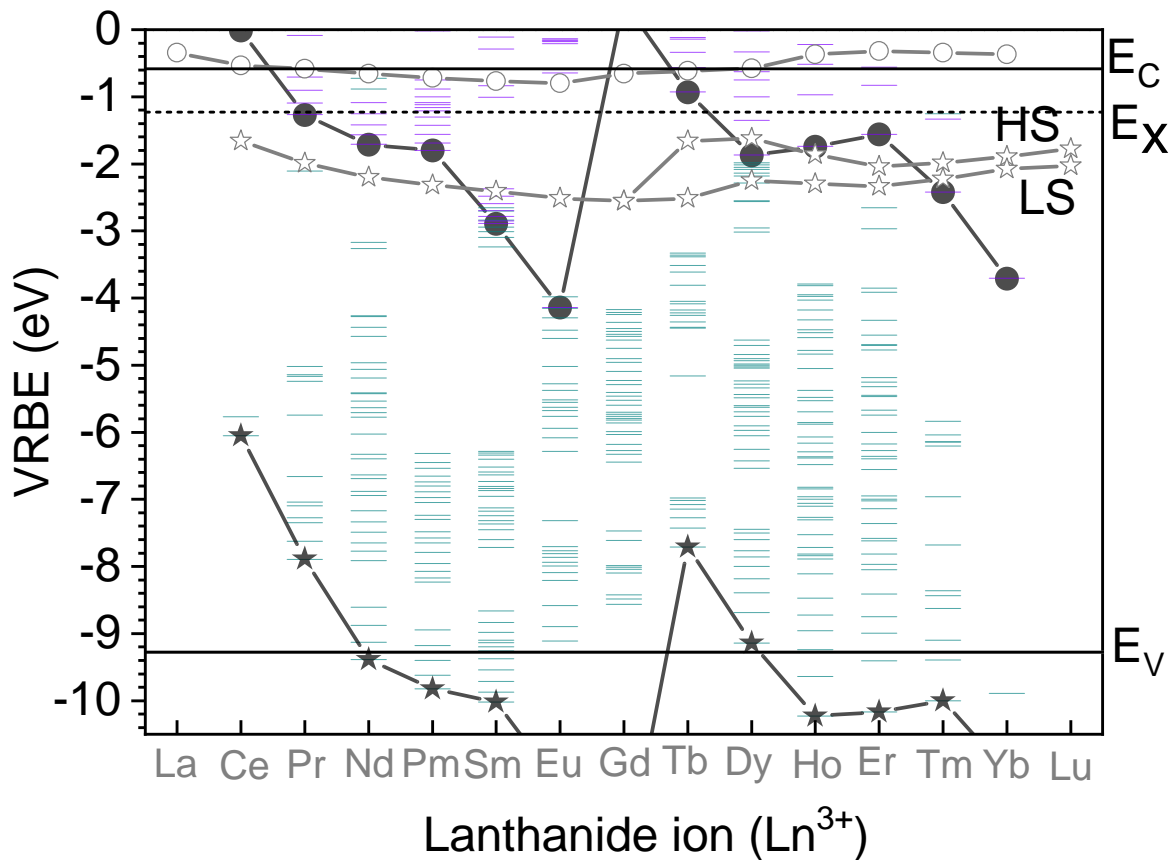


Fig. S1 VRBE diagram of electronic structure of lanthanide ions in the divalent, and trivalent state of LaPO₄ host. The connected black line indicates the ground state (4f) for all lanthanides in their +3 state (connecting filled star symbol), whereas the connected dark black circles (connecting filled circles), represents the ground state for all lanthanides in their +2 state. The connected light gray line (connecting empty stars) and light gray lines (connecting empty circles) represent the lowest 5d states for all lanthanides in their +3 and +2 state, respectively. The top of the valence band (E_V), the electron binding energy in the exciton state (E_x), and the bottom of the CB (E_C), as well as the high-spin (HS) and low-spin (LS) states, are also indicated. The HS and LS states represent spin-forbidden and spin-allowed transitions, respectively.

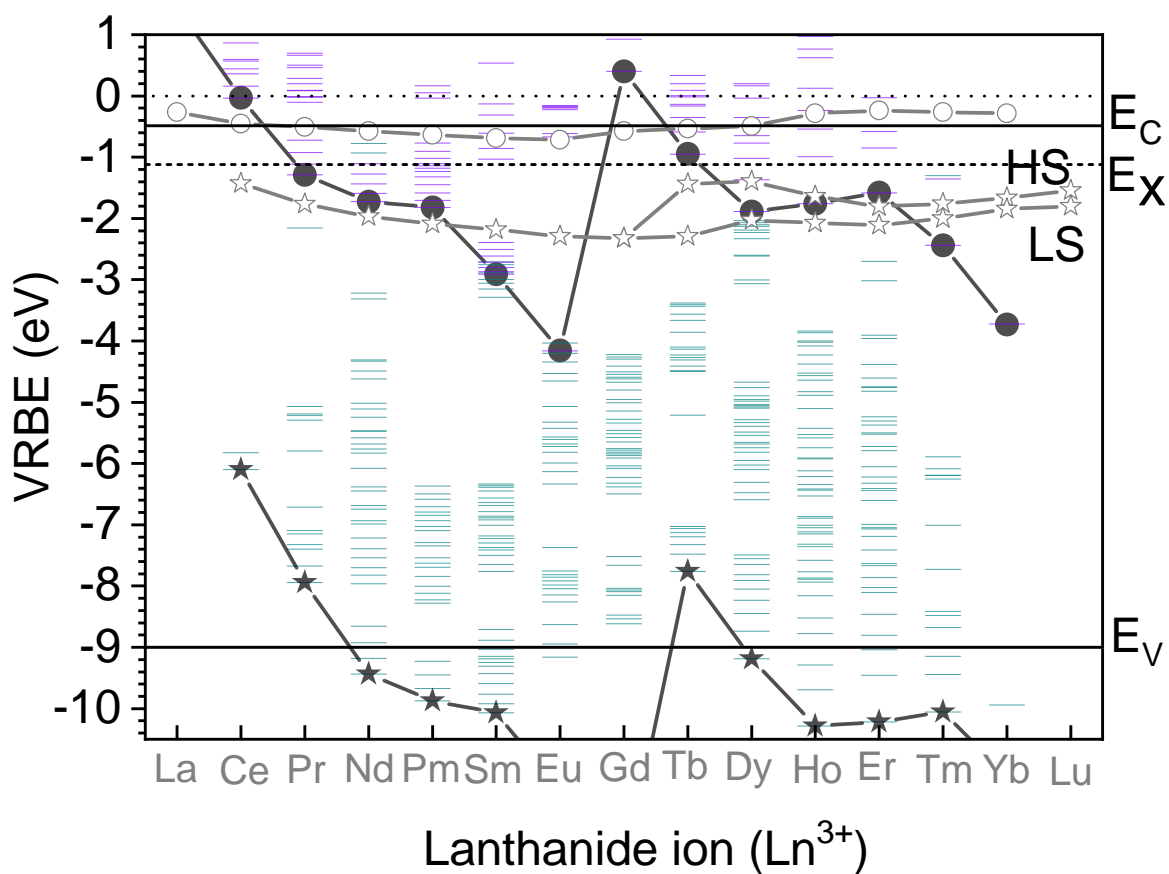


Fig. S2 VRBE diagram of electronic structure of lanthanide ions in the divalent, and trivalent state of GdPO_4 host. The connected black line indicates the ground state ($4f$) for all lanthanides in their $+3$ state (connecting filled star symbol), whereas the connected dark black circles (connecting filled circles), represents the ground state for all lanthanides in their $+2$ state. The connected light gray line (connecting empty stars) and light gray lines (connecting empty circles) represent the lowest 5d states for all lanthanides in their $+3$ and $+2$ state, respectively. The top of the valence band (E_V), the electron binding energy in the exciton state (E_X), and the bottom of the CB (E_C), as well as the high-spin (HS) and low-spin (LS) states, are also indicated. The HS and LS states represent spin-forbidden and spin-allowed transitions, respectively.

Table S1 The comparison of structural parameters for the two samples.

Parameters	Sample	
	CePO ₄	GdPO ₄
a (Å)	6.777(3)	6.621(2)
b	6.993(3)	6.823(2)
c	6.445(3)	6.310(2)
β (Degree)	103.54(4)	104.16(2)
V(Å ³)	296.97 (3)	276.4(4)
Space group	P2 ₁ /n	P2 ₁ /n
Crystal structure	Monoclinic	Monoclinic
Density (Mg m ⁻³)	5.26	6.061