

Raman spectroscopy and high spectral  
resolution luminescence of Ce<sup>3+</sup> doped  
Tb<sub>3</sub>Al<sub>5</sub>O<sub>12</sub> single crystalline film  
phosphors grown onto Gd<sub>3</sub>Al<sub>2.5</sub>Ga<sub>2.5</sub>O<sub>12</sub>  
and Y<sub>3</sub>Al<sub>5</sub>O<sub>12</sub> substrates

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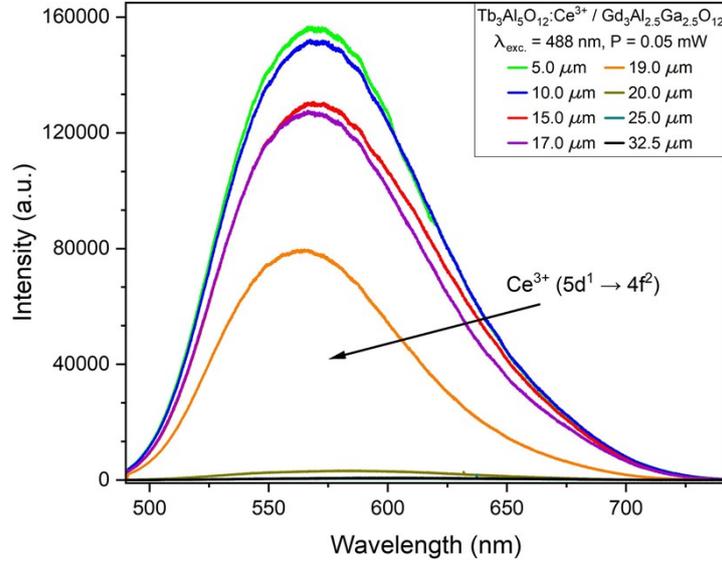
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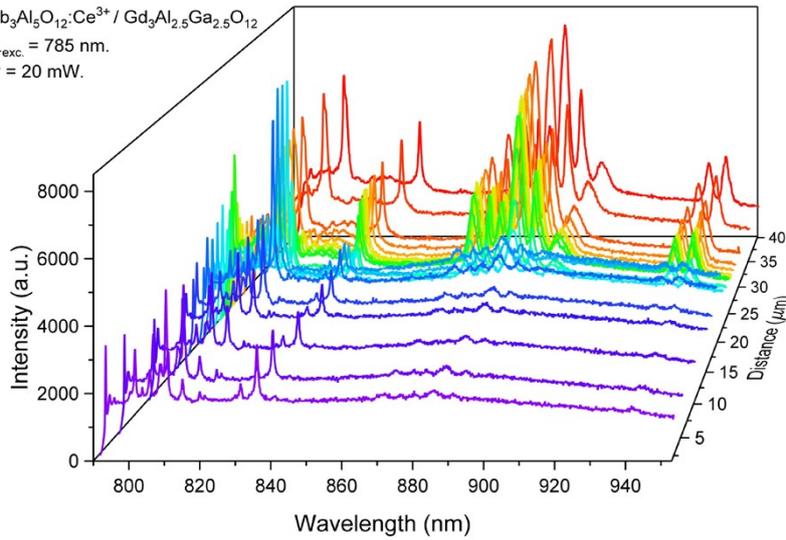
**SUPPLEMENTARY INFORMATION**

## 1. High Spectral Resolution Luminescence

Figure S1 shows selected HSRL spectra for the  $\text{Tb}_3\text{Al}_5\text{O}_{12}:\text{Ce}^{3+}/\text{Gd}_3\text{Al}_2.5\text{Ga}_{2.5}\text{O}_{12}$  sample upon excitation with a 488 nm wavelength, with luminescence originating from the 5d-4f electronic transitions of the cerium dopant. Figure S2 presents a three-dimensional plot of the evolution of the observed luminescence associated with the unintentional  $\text{Nd}^{3+}$  impurity as a function of the measured distance upon excitation with a 785 nm wavelength.

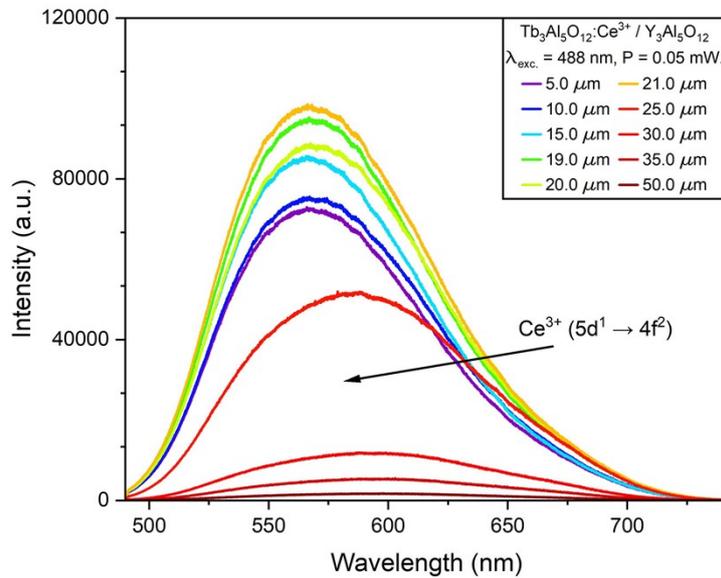


**Figure S1.** Selected HSRL spectra of  $\text{Tb}_3\text{Al}_5\text{O}_{12}:\text{Ce}^{3+}/\text{Gd}_3\text{Al}_{2.5}\text{Ga}_{2.5}\text{O}_{12}$  obtained under 488 nm excitation wavelength.

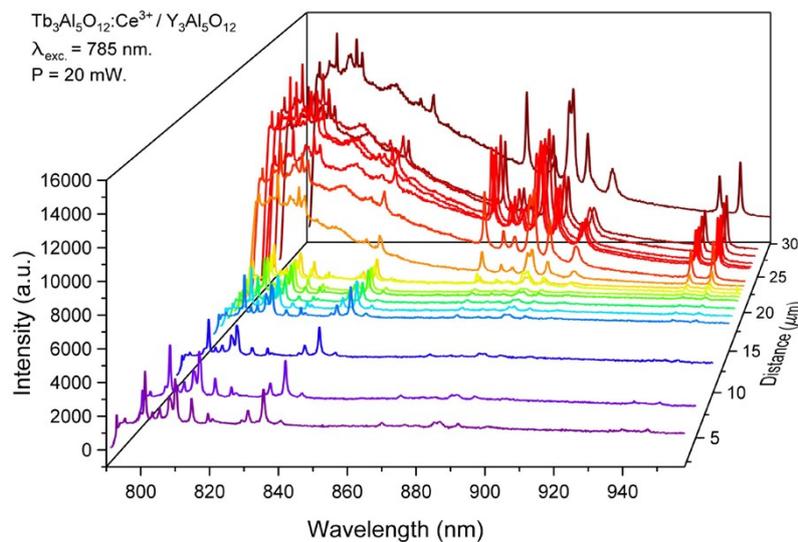


**Figure S2.** Three-dimensional HSRL spectra of  $\text{Tb}_3\text{Al}_5\text{O}_{12}:\text{Ce}^{3+}$  SCF grown onto  $\text{Gd}_3\text{Al}_{2.5}\text{Ga}_{2.5}\text{O}_{12}$  SC obtained under 785 nm excitation wavelength.

Figure S3 depicts the representative HSRL spectra obtained for the  $\text{Tb}_3\text{Al}_5\text{O}_{12}:\text{Ce}^{3+}/\text{Y}_3\text{Al}_5\text{O}_{12}$  structure under excitation with a 488 nm laser line. Figure S4 shows a three-dimensional plot illustrating the change in intensity of the acquired luminescence signal associated with non-intentional impurities ( $\text{Tm}^{3+}$ ,  $\text{Nd}^{3+}$ ), measured as a function of probing distance upon excitation with a 785 nm wavelength.



**Figure S3.** Selected HSRL spectra of  $\text{Tb}_3\text{Al}_5\text{O}_{12}:\text{Ce}^{3+}/\text{Y}_3\text{Al}_5\text{O}_{12}$  obtained under 488 nm excitation wavelength.



**Figure S4.** Three-dimensional HSRL spectra of  $\text{Tb}_3\text{Al}_5\text{O}_{12}:\text{Ce}^{3+}$  SCF grown onto  $\text{Y}_3\text{Al}_5\text{O}_{12}$  SC obtained under 785 nm excitation wavelength.