

## Supporting Information

### Broadening the Valid Temperature Range of Optical Thermometry Through Dual-mode Design

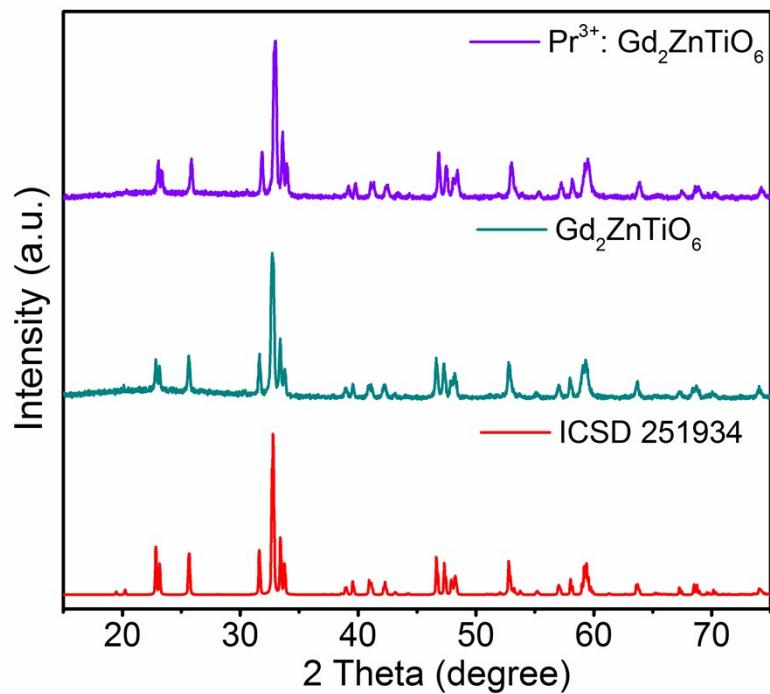
Yan Gao, Yao Cheng\*, Tao Hu, Zeliang Ji, Hang Lin, Ju Xu, Yuansheng Wang\*

CAS Key Laboratory of Design and Assembly of Functional Nanostructures, and Fujian Key Laboratory of Nanomaterials, Fujian Institute of Research on the Structure of Matter, Chinese Academy of Sciences, Fuzhou, Fujian, 350002 (P. R. China)

#### Corresponding author

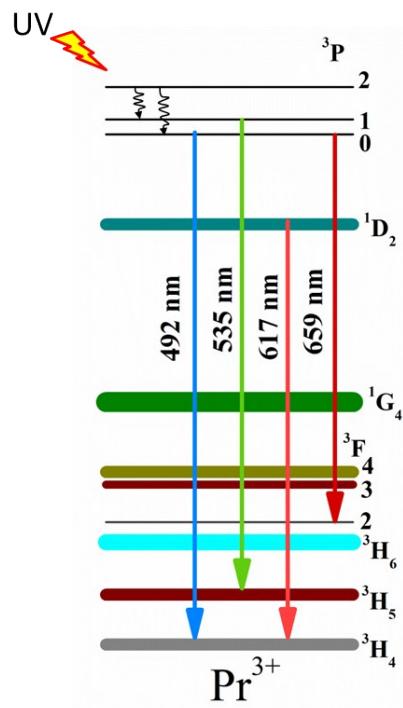
\*E-Mail: chengyao@fjirsm.ac.cn; yswang@fjirsm.ac.cn

**Fig. S1**



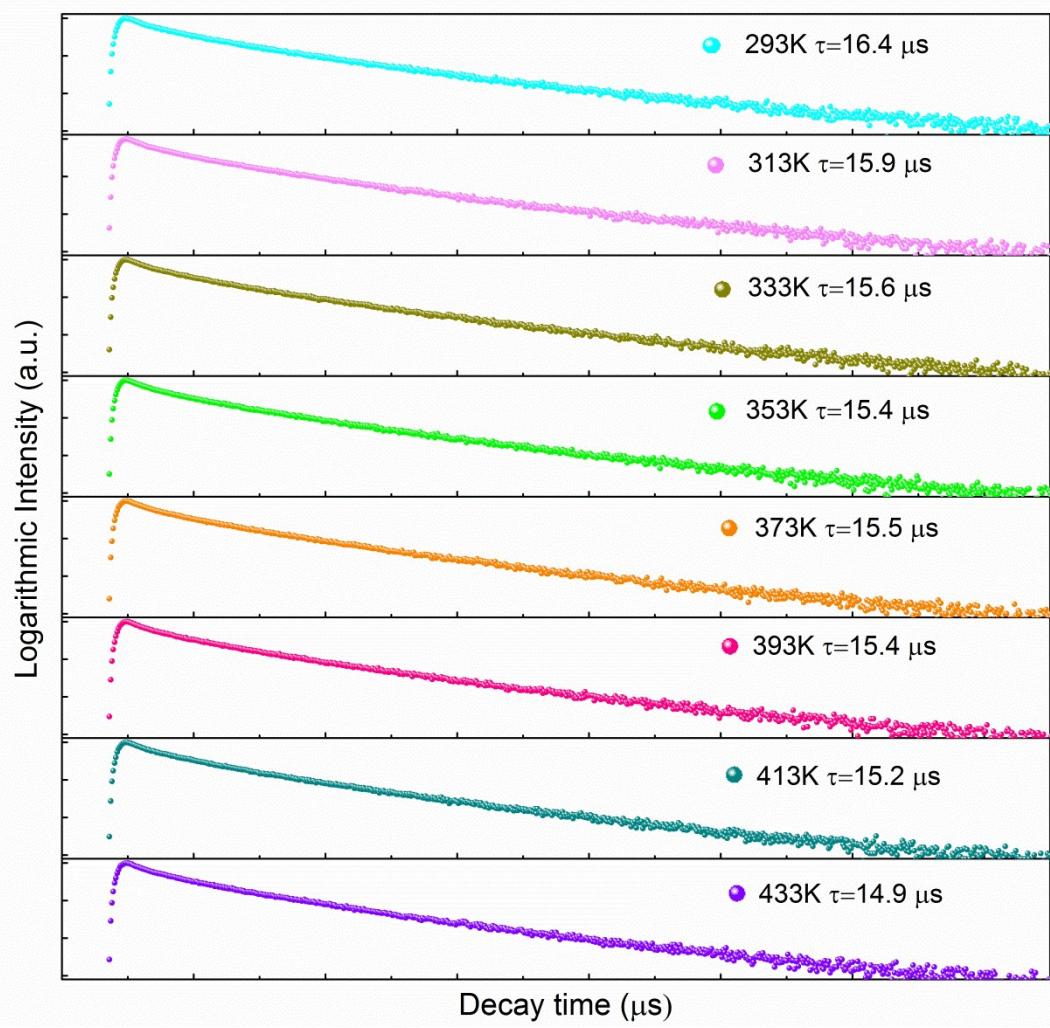
**Fig. S1** XRD patterns of the  $\text{Gd}_2\text{ZnTiO}_6$  and  $\text{Pr}^{3+}: \text{Gd}_2\text{ZnTiO}_6$  samples; red curve present the standard data of ICSD 251934.

**Fig. S2**



**Fig. S2.** The energy level diagram of  $\text{Pr}^{3+}$  ions in  $\text{Gd}_2\text{ZnTiO}_6$ .

**Fig. S3**



**Fig. S3.** Fluorescence decay curves of  ${}^1\text{D}_2$  emitting state ( $\lambda_{\text{ex}}=300$  nm,  $\lambda_{\text{em}}=617$  nm), recorded from 303 K to 433 K.

**Table S1**CIE coordinate data of the Pr<sup>3+</sup>: Gd<sub>2</sub>ZnTiO<sub>6</sub> sample recorded from 293 K to 433 K.

Temperature (K)	CIE x	CIE y
293	0.566	0.375
313	0.584	0.365
333	0.603	0.356
353	0.617	0.350
373	0.628	0.346
393	0.635	0.344
413	0.640	0.344
433	0.642	0.343