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Authors: Jiaomei Wang, Hang Lin, Yao Cheng, Xiangshui Cui, Yan Gao, Zeliang Ji, Ju Xu, Yuansheng Wang



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A Novel High-sensitive Upconversion Thermometry Strategy: Utilizing Synergistic Effect of Dual-wavelength Lasers Excitation to Manipulate Electron Thermal Distribution

Jiaomei Wang,^{a,b} Hang Lin,^{*,a,c} Yao Cheng,^a Xiangshui Cui,^{a,b} Yan Gao,^{a,b} Zeliang Ji,^{a,b} Ju Xu,^a Yuansheng Wang^{*,a}

^a 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);

^b University of Chinese Academy of Sciences, Beijing, 100049 (P. R. China);

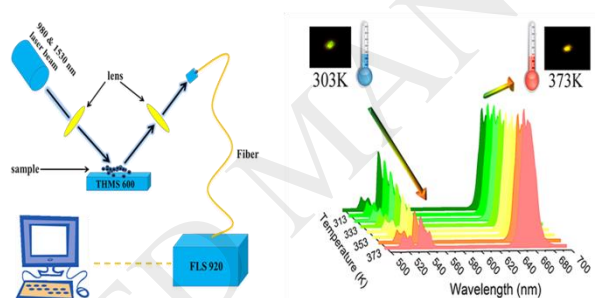
^c State Key Laboratory of Structural Chemistry, Fuzhou, Fujian, 350002 (P. R. China);

* Corresponding Authors. E-mail: lingh@fjirsm.ac.cn; ywang@fjirsm.ac.cn

E-mail: lingh@fjirsm.ac.cn; Tel/Fax: +86-591-63179423

E-mail: ywang@fjirsm.ac.cn; Tel/Fax: +86-591-63179438

Graphical abstract



Novel thermometry strategy by utilizing synergistic effect of dual-wavelength lasers to manipulate the electron thermal distribution is proposed, which shows good temperature detection accuracy and signal discriminability in the physiological temperature range.

Highlights:

- A novel thermometry strategy utilizing synergistic effect of dual-wavelength lasers
- A thermometry strategy going beyond limitation of the conventional TCL strategy
- The established T-sensitive electronic relation between $\text{Er}^{3+}:^4\text{S}_{3/2}$ and $\text{Er}^{3+}:^4\text{F}_{9/2}$
- High sensitivity and spatial resolution in the physiological temperature range

Abstract:

Conventional upconversion thermometry strategy, based on the thermally coupled levels (TCL) of lanthanide ions, confronts a dilemma in simultaneously achieving high absolute/relative temperature (T) sensitivities (S_a and S_r) and good signal discriminability.

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