**Investigation on the optical thermometry using fluorescence intensity ratio in microcrystals**

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### Abstract (300 word limit)

Temperature is an important parameter in our daily life. However, some circumstances aren’t suitable for contacting temperature measurement such as volcanic, coal mines and high-voltage power stations. To our delight, the emission intensities of adjacent energy levels can be thermally populated in different temperature due to the Boltzmann distribution. Thus, it can precisely show the temperature through detecting the fluorescence intensity ratio. In our previous experiments, the NaGdTiO4 and β-NaLuF4:Yb3+/Er3+ microcorystals have been obtained by the traditional solid-state reaction method and hydrothermal method to study the temperature sensing property, respectively. In NaGdTiO4:Yb3+/Tm3+ experiment, the multi-ratios of the upconversion intensities increase linearly with temperature (100K-300K) provides us a simple and accurate temperature measurement method. Multi-ratios can be more accurate than using only one, allowing for self-referenced temperature determination. In addition, the NaLuF4 microcorystals are also deeply studied. By introducing the 40% of Ca2+ ions, the upconversion luminescence intensities are obvious enhanced. The excellent upconversion luminescence is more suitable for temperature sensing, owing to the feasibility in the practical applications. The maximum sensitivity of β-NaLuF4:20Yb3+/2Er3+/40Ca2+ (mol%) is 0.00040K-1 at 120K under the excitation pump power 1W, indicating that the sample with Ca2+ has potential for application to temperature sensing.

**Recent Publications ()**

1. Aihua Zhou, Feng Song, Yingdong Han, etc., CrystEngComm, 2018, 20, 2029-2035.
2. Aihua Zhou, Feng Song, Yingdong Han, etc., Journal of luminescence, 2018, 194, 225-230.
3. Aihua Zhou, Feng Song, Feifei Song, etc., Optical Materials, 2018, 78, 438-444.



Biography (150 word limit)

Aihua Zhou is still a doctoral candidate in nankai university. From 2014 to 2016, she works on the surface plasmon polariton enhanced quantum cutting for improvement of the conversion efficiency of the silicon-based solar cell. From 2016 to present, her research concentrates on optical temperature sensing of rare-earth ion doped phosphors.

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2. Daqin Chen, Shen Liu, Wei Xu, Xinyue Li, J. Mater. Chem. C, 2017, 5, 11769-11780.
3. Ł. Marciniak, A. Bednarkiewicz, M. Stefanski, R. Tomala, D. Hreniak, W. Strek, Phys. Chem. Chem. Phys., 2015, 17, 24315-24321.