

Abstract Submitted  
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**Luminescence thermometry using upconverted emissions** LI MA, Georgia Southern University, ZUOLING FU, Jilin University, XIAOJUN WANG, Georgia Southern University — Luminescence thermometry has been widely used for measuring temperature, the most commonly measured physical quantity. Luminescence intensity and related properties, such as emission lifetime, risetime, and profile, may change as the temperature of a measured substance varies, and any of the changes could be used, after calibration, to determine the temperature of the substance. Temperature dependent and energy downshifting luminescence from rare earth activators has been extensively studied for measuring a broad range of temperatures, but it unfits the biological applications considering the optical window for absorption in tissues. In this talk, we will present a temperature measurement using upconverted luminescence, in which the less absorbed and low energy infrared photons are converted to high energy visible photons in biological systems. Fluorescence intensity ratio (FIR) measured from a pair of thermally coupled excited states is used to obtain the local temperature where photothermal treatment or bioimaging is performed. Rare earth ions doped oxides and fluorides phosphors or nanophosphors are chosen for the demonstration<sup>1,2</sup>. The thermometry can be readily adopted for teaching advanced physics laboratory. References 1. G. Liu, Z. Sun, Z.L. Fu, L. Ma, X.J. Wang, *Talanta* 169, 181-188 (2017). 2. G. Liu, Z. Fu, T. Sheng, Z. Sun, X. Zhang, Y. Wei, L. Ma, X.J. Wang, Z. Wu, *RSC Adv* 6, 97676-97683 (2016)..

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