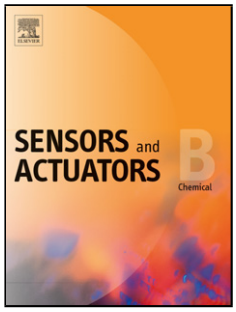

Title: A Novel High-sensitive Upconversion Thermometry Strategy: Utilizing Synergistic Effect of Dual-wavelength Lasers Excitation to Manipulate Electron Thermal Distribution

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

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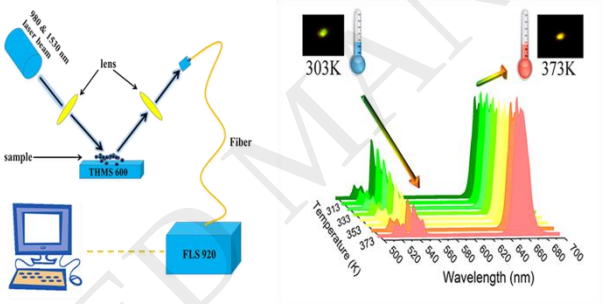
Graphical abstract



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 Er^{3+}:$^4S_{3/2}$ and Er^{3+}:$^4F_{9/2}$
- 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.