

# Development of Nanoscale Thermometry using Near-field Optics

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Recently, great advances in nanoscale optical sensing techniques have brought dramatic progresses in the field of thermophysical properties engineering with brilliant characteristics of superior spatio-temporal resolution. This talk introduces our recent studies developing new sensing techniques using a near-field light for a nanoscale thermometry. The nanoscale thermometry with less than 100-nm spatial resolution using the high sensitive near-field optical fiber probe, which was fabricated by the three-step selective chemical etching and the fusion-splicing method with the low-noise photonic crystal fiber [1], will be demonstrated. In this technique, the temperature dependence of the fluorescence decay time and the polarized plane were detected through the near-field optical fiber probe (Illumination-collection mode: IC-mode). This IC-mode can achieve the nanoscale spatial resolution compared with other modes.

[1] D. Seto, R. Nikka S. Nishio, Y. Taguchi and Y. Nagasaka, *Appl. Phys. Lett.* **110**, 033109 (2017).