“Temperature measurement and thermal activation of single living cells.”

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[abstract]
‘Temperature’ can be considered as a local parameter even at the sub-cellular scale without theoretical consideration affecting macroscopic steady-state definition [1].
Requirements from biology, medical biology and electronics, thermometry at the small scale has been extensively studied [2]. There are two kinds of methods; luminescent and non-luminescent ones. The former is to measure the optical properties of materials as small as nanometer to micrometer sizes such as fluorophores and quantum dots. The latter includes, e.g., scanning thermal microscopy and the measurement of thermoreflectance. We have been focused on the optical methods as it is easy to combine them with other optical methodologies that are commonly used in biomedical fields [3-7].
We have also studied cellular responses to the microscopic temperature stimulus [1,4,5,8]. Local temperature gradients were created by focused infra-red laser beams either onto a metal aggregate or directly into the media. The temperature gradient created around a small heat source during laser illumination disappears immediately when the laser is terminated, as the heat quickly diffuses out through the surrounding medium.
I will introduce these methodologies developed as collaborations among multiple expertise, and new cellular insights found by using these methods.

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