

2015

Ultrasensitive Fluorescent Thermometer for Cellular Temperature Mapping

Overview

“Cellular Thermoprobe for Fluorescence Lifetime” is a fluorescent polymeric thermometer for living cells. The probe is cell-permeable, diffuses throughout the cells and gives the information about intracellular temperature distribution by fluorescence lifetime imaging microscopy. It can be delivered into cell without microinjection. It is highly photo-stable and easy-to-use. The probe enables us to distinguish intracellular temperature in cultured mammalian cells at organelle level. For instance, the previous report demonstrated that the average temperature difference between the nucleus and the cytoplasm was 0.98°C.

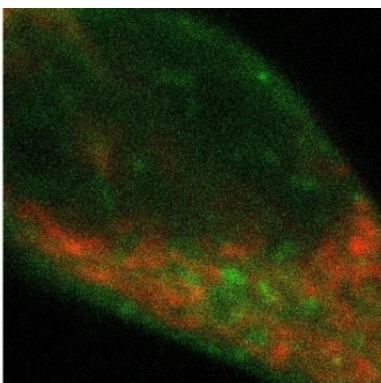
“Cellular Thermoprobe for Fluorescence Lifetime” is an innovative new reagent that provides unprecedented scientific insight.

Features

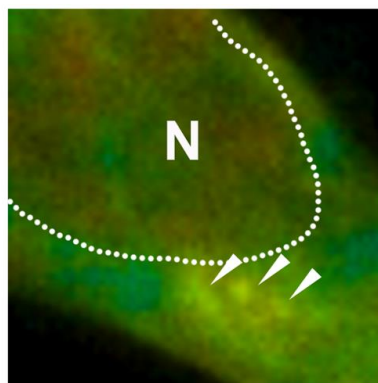
- Cellular Thermoprobe for Fluorescence Lifetime is cell-permeable, easy to introduce into both adherent and suspension cells.
- The spatial and temperature resolutions of the probe are at the diffraction limited level (200 nm).
- The probe has little influence on cellular environmental conditions such as pH, ionic strength, protein etc.
- Local concentration of the probe, excitation strength, fluorescence fade, excitation wavelength don't affect temperature measurement.
- For approximately 5 - 20 assays per 200 µg. It depends on the concentration and reaction volume.

Heat production by the mitochondria in living HeLa cells

Fluorescence



FLIM



(Left)
Confocal fluorescence image
Green: Cellular Thermoprobe
Red: Mitochondria

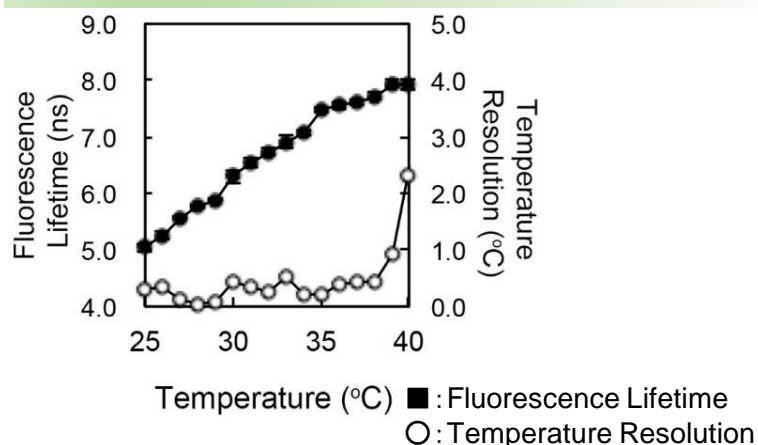
(Right)
Fluorescence lifetime image

4.0 Fluorescence Lifetime (ns) 8.0
(22.6 °C) (40.6 °C)

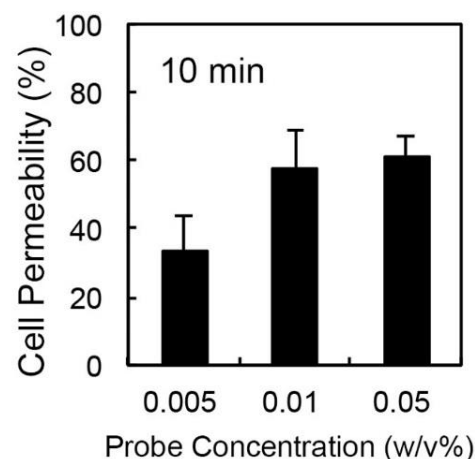
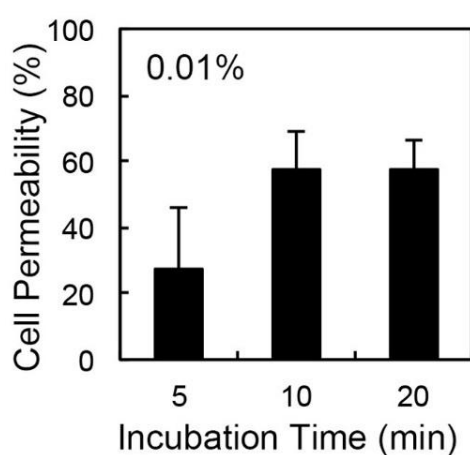
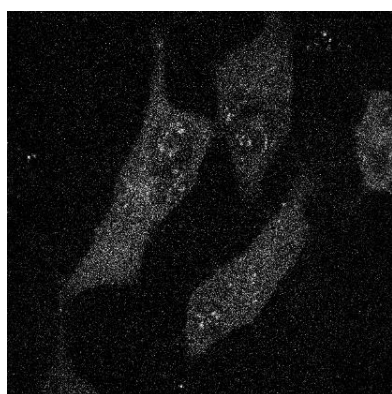
Introduction of Cellular Thermoprobe into Adherent Cells

1. Prepare the cells at the 30 to 50 % confluence on glass bottom dish or equivalent.
2. Remove the medium and wash with a 5 % glucose solution.
3. Add 0.01-0.05 w/v% of "Cellular Thermoprobe" in 5 % glucose solution.
4. Incubate the cells at 25°C for 10 minutes.
5. Wash the cells with PBS three times.
6. Add phenol red-free culture medium and measure the fluorescence lifetime.

Temperature-dependent change in the fluorescence lifetime of the Cellular Thermoprobe for Fluorescence Lifetime and the temperature resolution in HeLa cell extracts.



Introduction of Cellular Thermoprobe into HeLa cells



(Left) Image of the confocal fluorescence microscopy

(Middle) The incorporation efficiency of Cellular Thermoprobe into HeLa cells over time

(Right) The incorporation efficiency of the various concentration of Cellular Thermoprobe

Reference

Hayashi, T., *et al.*, PLoS ONE., 10(2), e0117677 (2015).

Product Information

[Manufacturer : FNA]

Product Name	Size	Catalog #	Storage
Cellular Thermoprobe for Fluorescence Lifetime	200 µg	FDV-0004	RT
	3 x 200 µg	FDV-0004	RT

NOTE

※ All products here are research use only, not for diagnostic use.
 ※ Specs might be changed for improvement without notice.

※ Company name and product name are trademark or registered mark.
 ※ Please contact your local distributors for orders, quote request and inquiry.

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