

Thermal Imaging using Temperature Sensitive Paint

T. Tsukamoto, M. Esashi and S. Tanaka

Tohoku University

Thermal Imaging methods using TSP

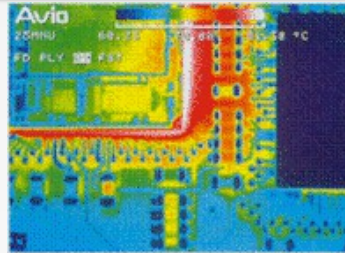
Thermal imaging

Measure the temperature distribution

Health care

Military

Evaluation of microdevices.



High speed thermal imaging using TSP

Low cost

TSP + CCD camera + UV illumination

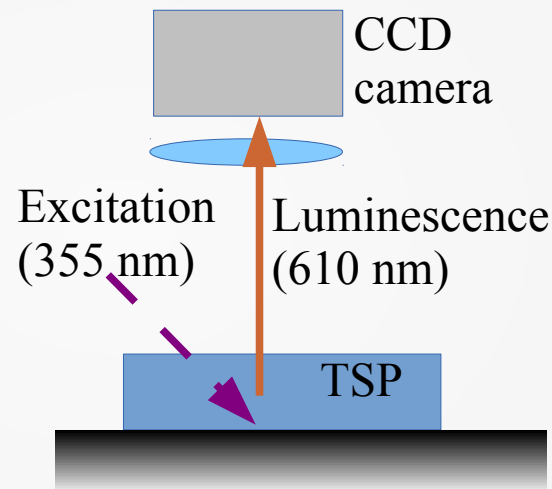
→ important for real applications

High magnification

... microscope for visible light

High speed thermal imaging

... using UV flash method



Intensity of luminescence from the TSP

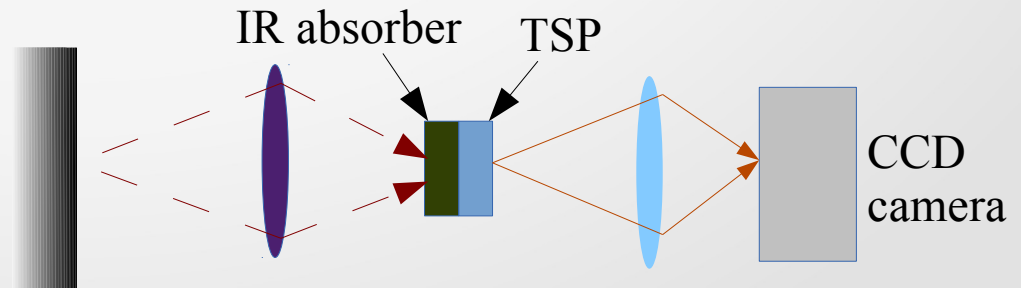
$\text{Eu}(\text{TTA})_3 + \text{PVB}$

TSP = Temperature Sensitive Paint

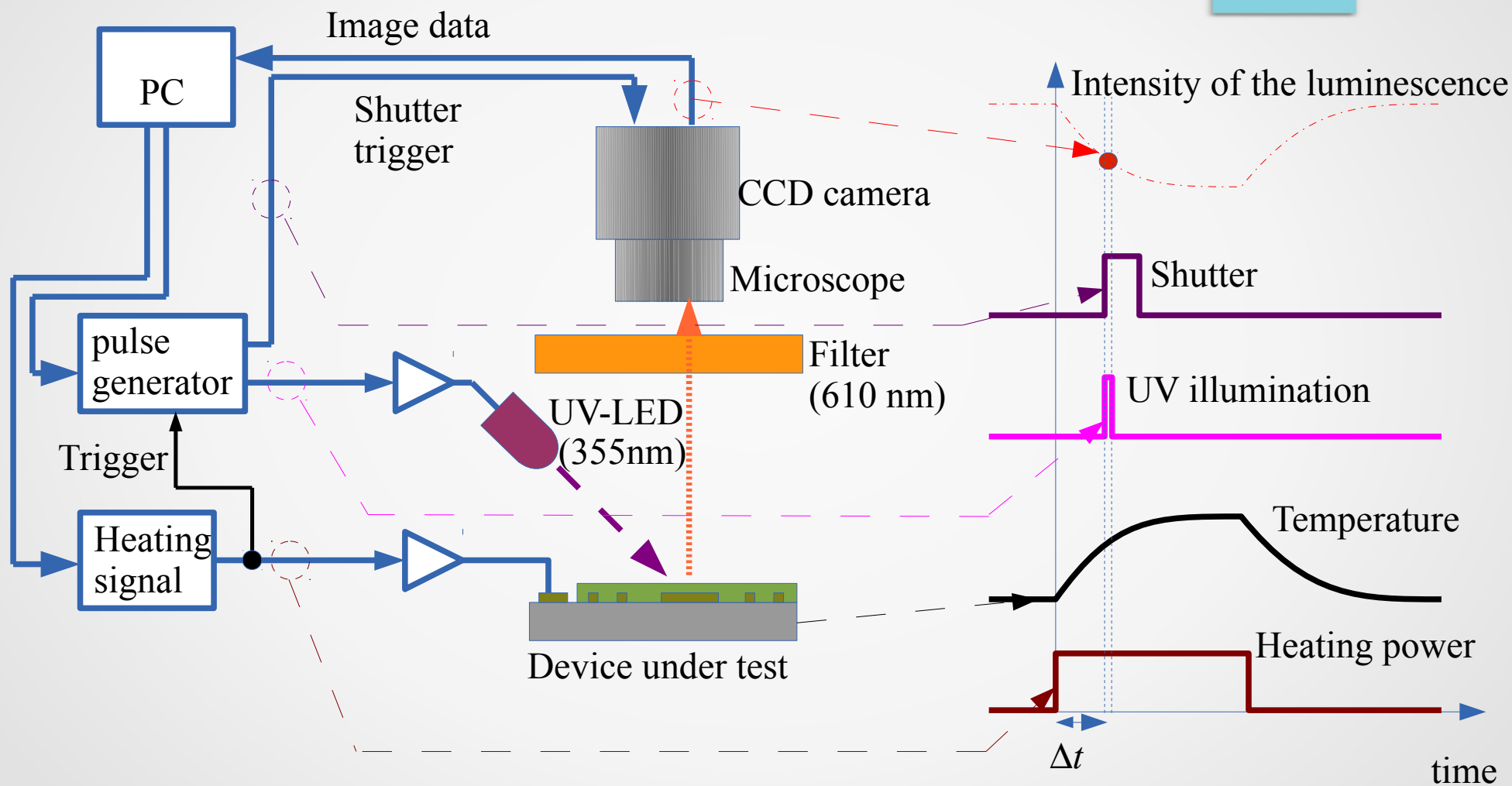
IR-to-visible converter array

Incident IR is converted to the temperature rise of TSP microstructures.

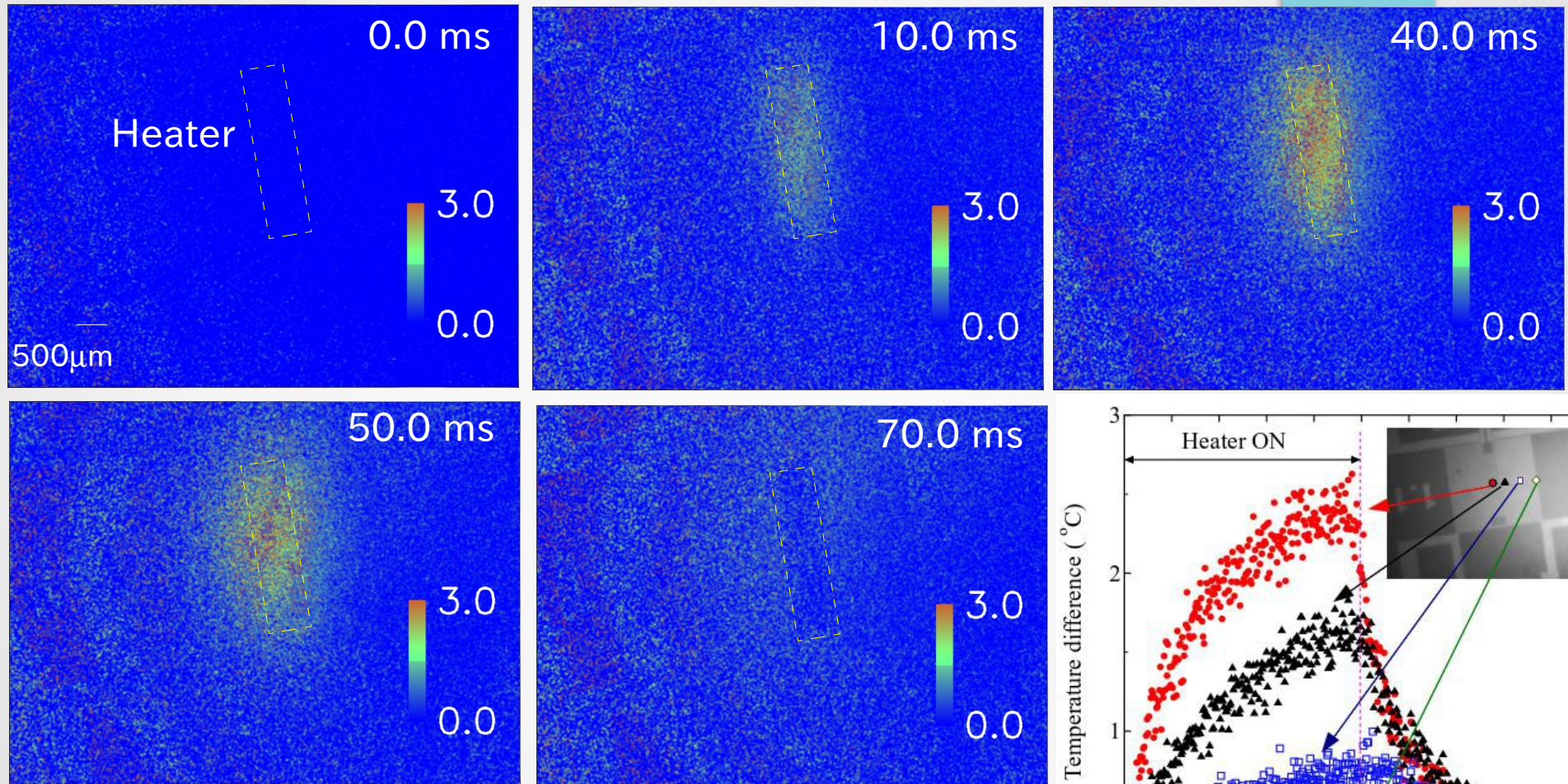
Read out by the CCD camera.



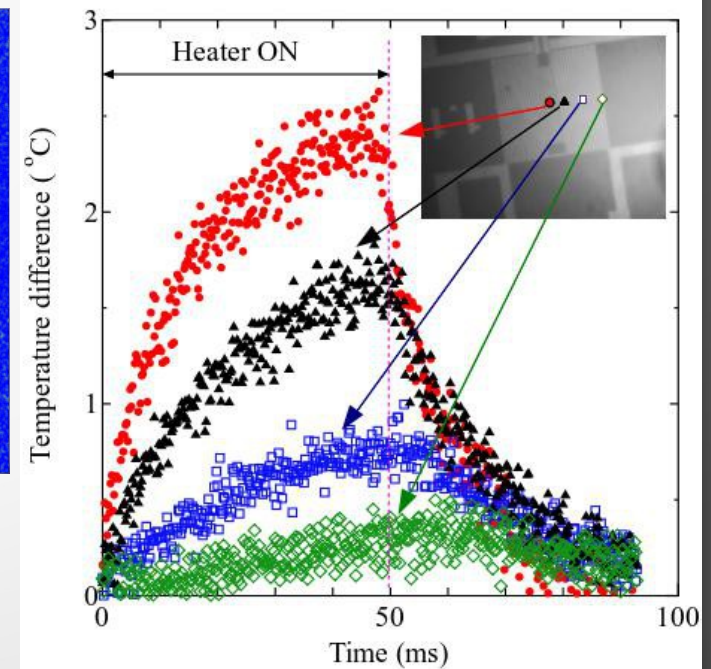
High speed thermal imaging using UV flashing method



Thermal images



Temporal resolution : 0.2 ms
Spatial resolution : 39 μm



Thermal imaging using IR-to-visible convertor

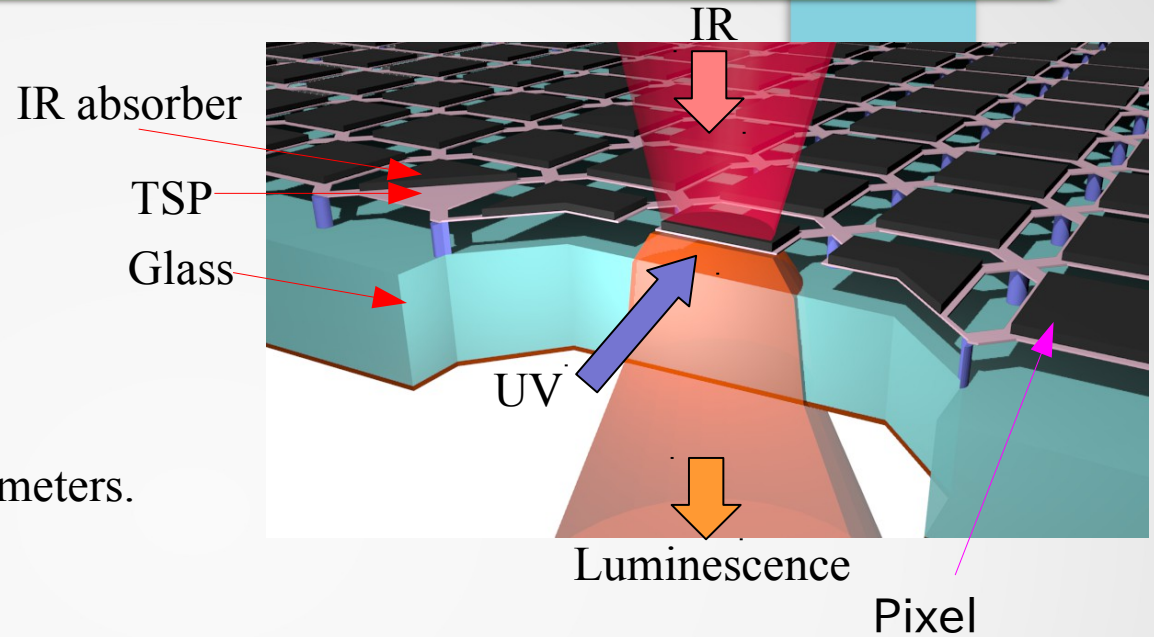
Self-suspende microstructures are heated by an incident IR.

Temperature of the microstructures are read by an optical way using TSP

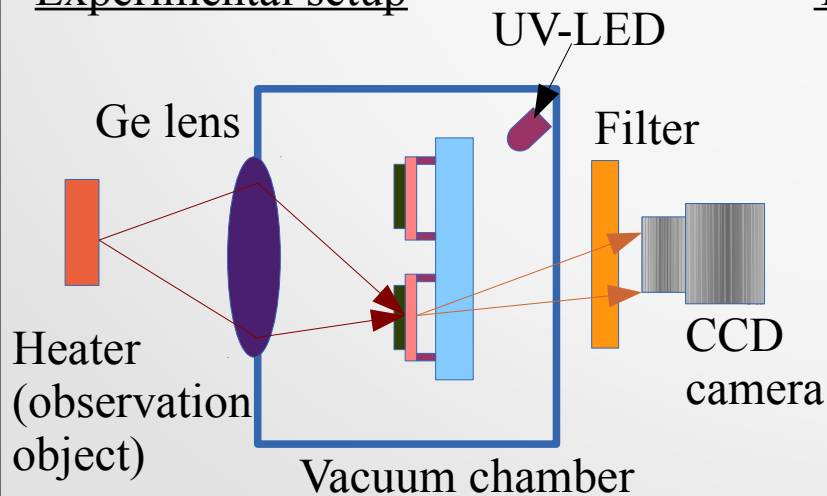
Easy to fabricate.

Thermal resistance of each pixel is higher than that of conventional bolometers.

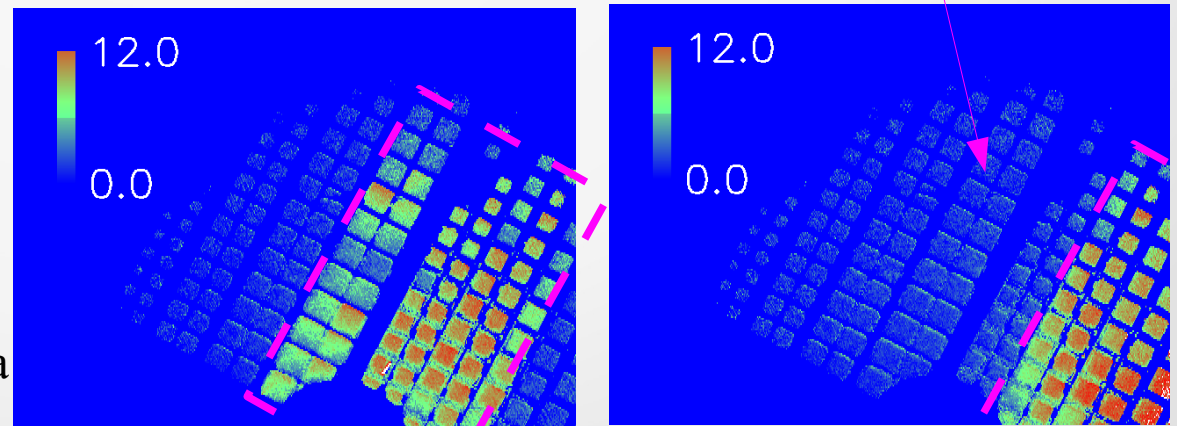
→ Sensitivity can be increased.



Experimental setup



Thermal image



Projected image of a heater