

KAJIHARA LAB.

[Manufacturing and THz microscopy]

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Manufacturing Science Fundamentals

Department of precision engineering

Nano-scale THz measurement

Visualizing local phenomena on material's surface

Terahertz wave (wavelength: $10\ \mu\text{m} \sim 1\ \text{mm}$) contains many important spectra of matters due to molecular vibration, lattice phonon, and biomolecular motion. We are developing a near-field microscope, which “passively (without external illumination)” detects spontaneous THz photons originated from localized phenomena at “nanoscale” resolution. We are also developing a new manufacturing technique

- ◆ Passive THz near-field microscopy without external illumination (spatial resolution = 60 nm)
- ◆ Visualization of thermal evanescent field on objects
- ◆ Non-destructive THz nano-thermometry
- ◆ Novel manufacturing technique

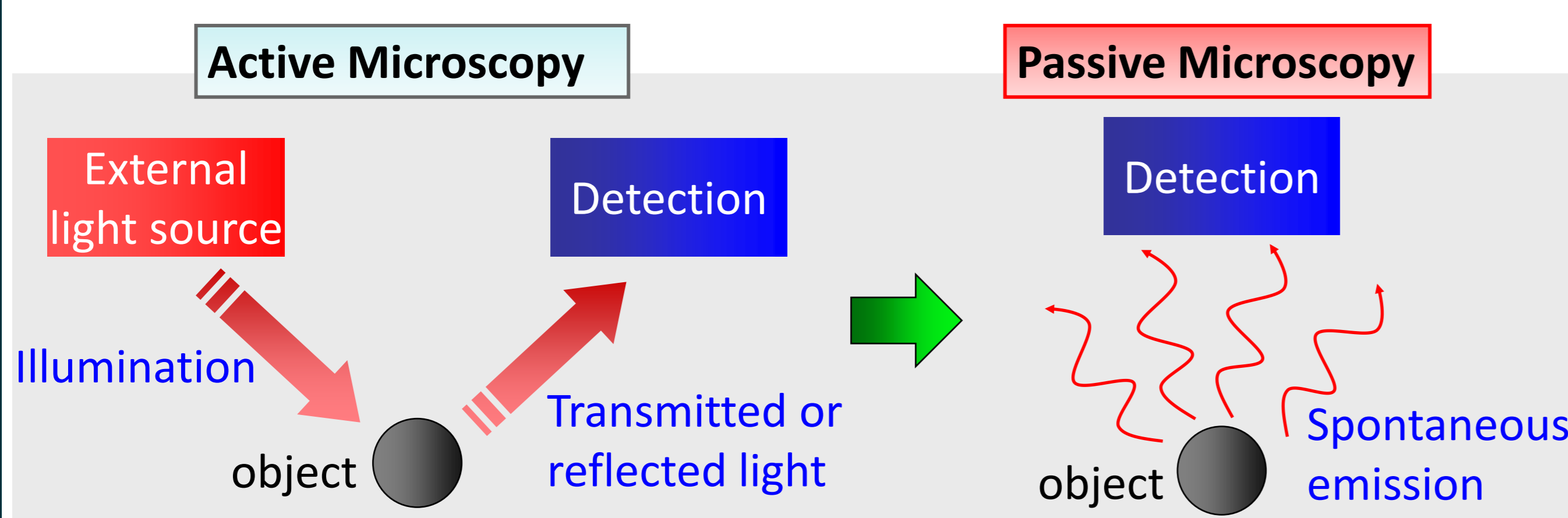


Fig.1 Conventional active measurement and our passive measurement

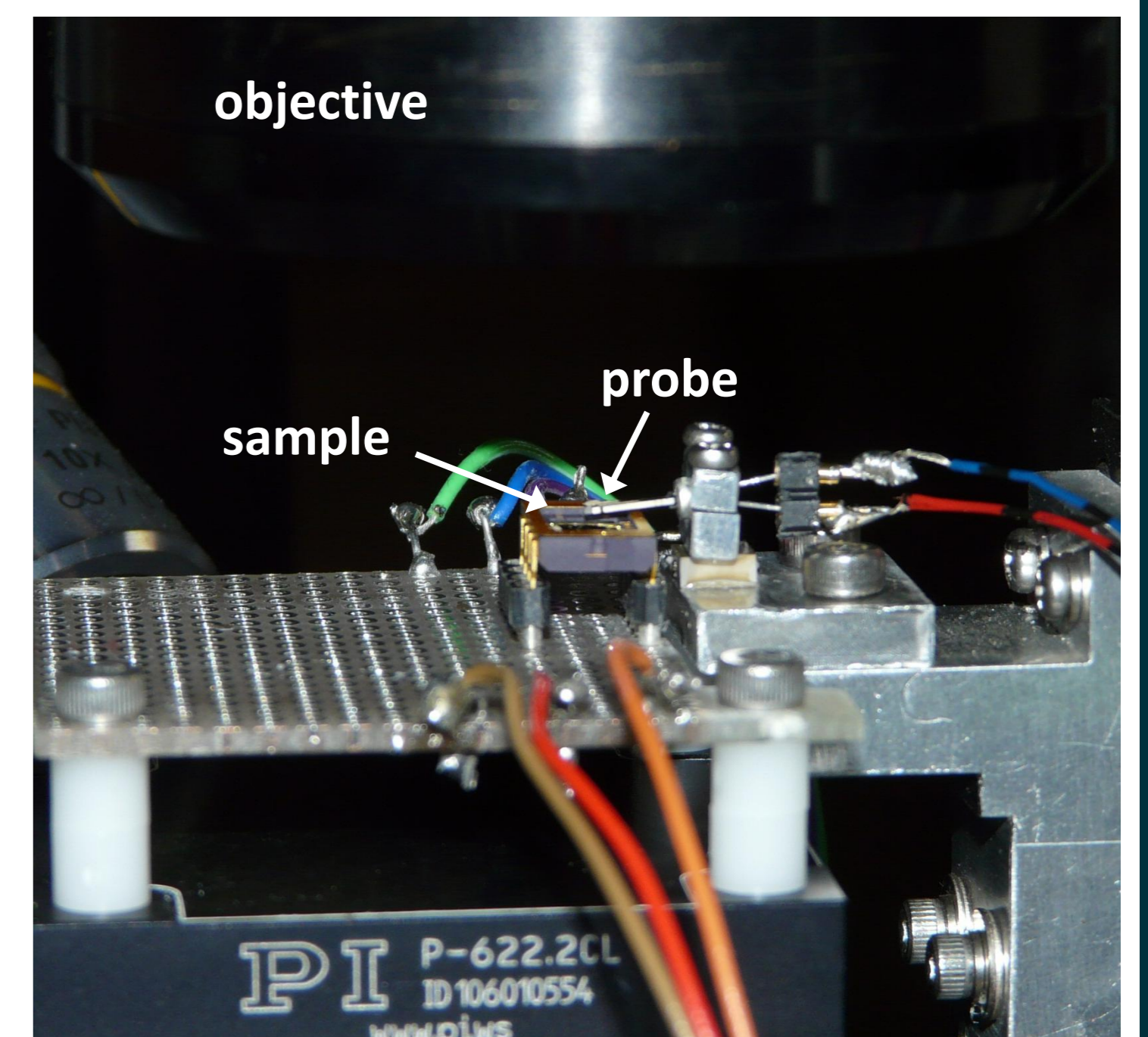
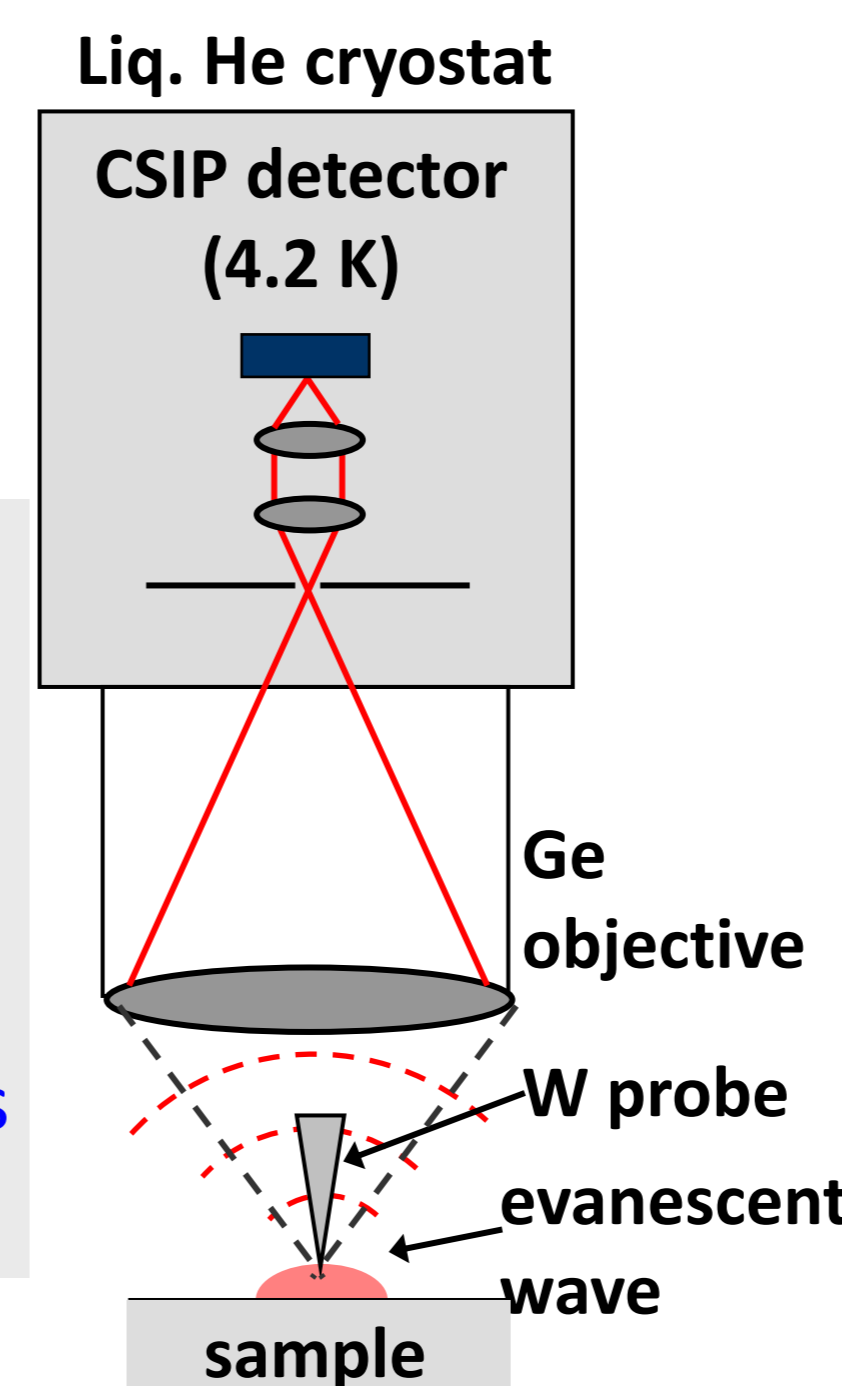


Fig. 2 Passive THz near-field microscope

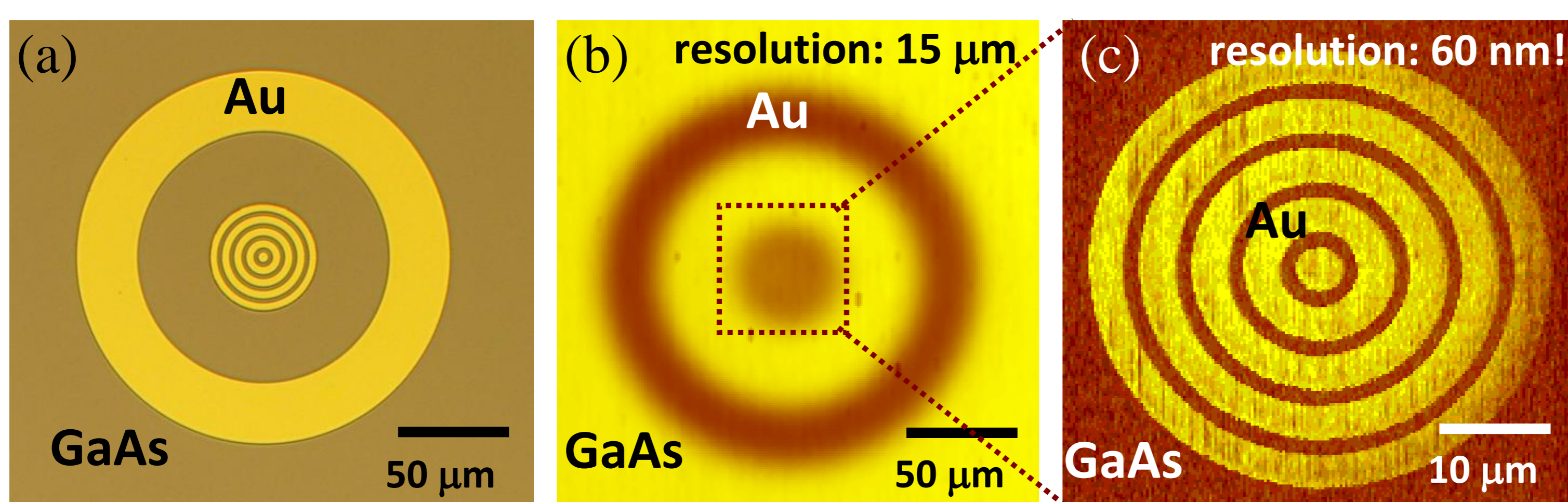


Fig.3 (a) Microscope image (b) Passive far-field image (c) Passive near-field image

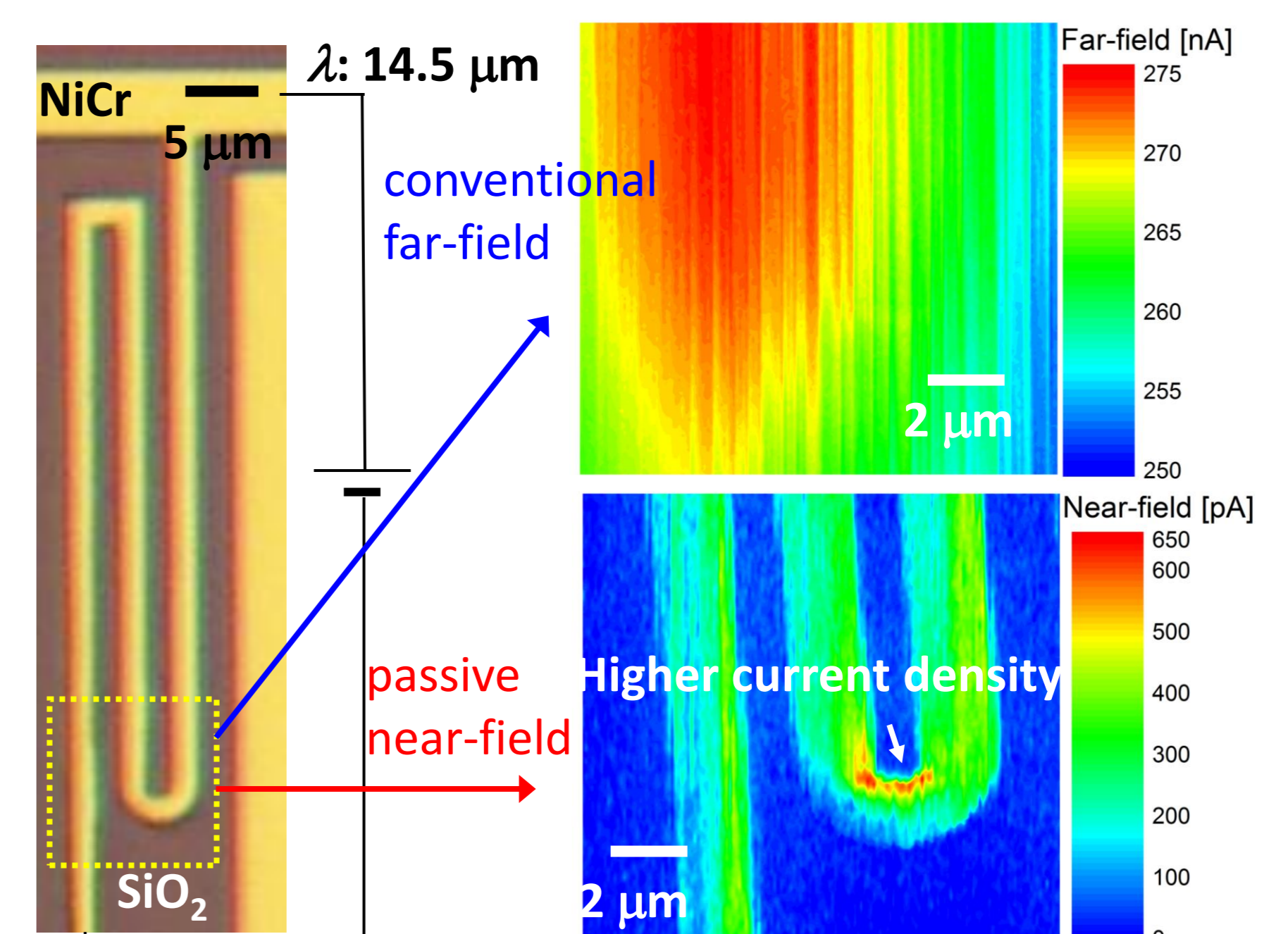


Fig. 4 Current density distribution mapped with THz nano-thermometry