IR Thermal Imaging device using Temperature Sensitive Paint

T. Tsukamoto, M. Wang and S. Tanaka

Tanaka Shuji Lab.
Tohoku University

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Thermal imaging

Detect infrared (IR) radiation emitted from the object (IR intensity is strongly depend on the surface temperature)

Problem ··· Expensive !!

We are developing a novel low-cost thermal imaging device based on IR-to-visible conversion

Thermal imaging using IR-to-visible convertor

- Heated object
- IR-to-visible transducer array
- Visible light
- CCD/CMOS imaging device
- Digital data
- IR power
- Visible light intensity
- Electric signal

Without IR irradiation:
- IR absorber
- TSP*
- Supporting leg
- UV

With IR irradiation:
- IR
- Heat flow
- Temperature rise
- Intensity change

*TSP = Temperature sensitive paint
Thermal imaging using IR-to-visible convertor

Easy to fabricate. Thermal resistance of each pixel is higher than that of conventional bolometers. → Sensitivity can be increased.
Fabrication (MEMS process)

1. Ge patterning

2. Black body paint filling

3. Al patterning

4. TSP patterning

5. SU-8 patterning

6. Bonding to glass substrate

7. Release from the temporary wafer
Thermal images

Pixel size: 0.1 mm
Minimum detectable temperature change: 300°C
Summery

- A novel IR thermal imaging device using IR-to-visible conversion was developed
- A pixel size was about 100 um
- Temperature as small as 300\degree C could be observed

- Now, develop a new device for high performance