

# IR Thermal Imaging device using Temperature Sensitive Paint

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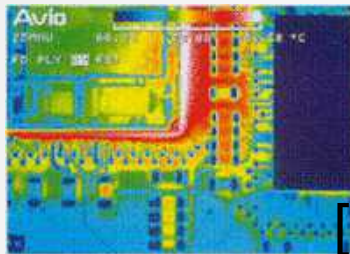
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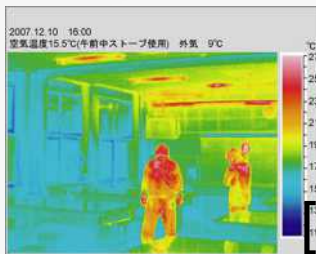
# Thermal imaging

## Thermal imaging

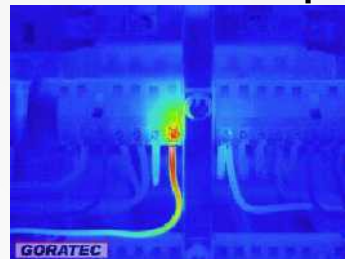
Detect infrared (IR) radiation emitted from the object  
(IR intensity is strongly depend on the surface temperature)



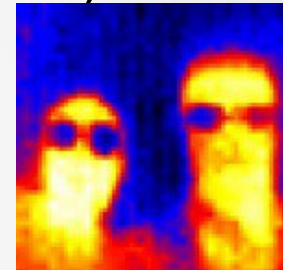
[1]



[2]



[3]



[4]

Problem ... Expensive !!



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

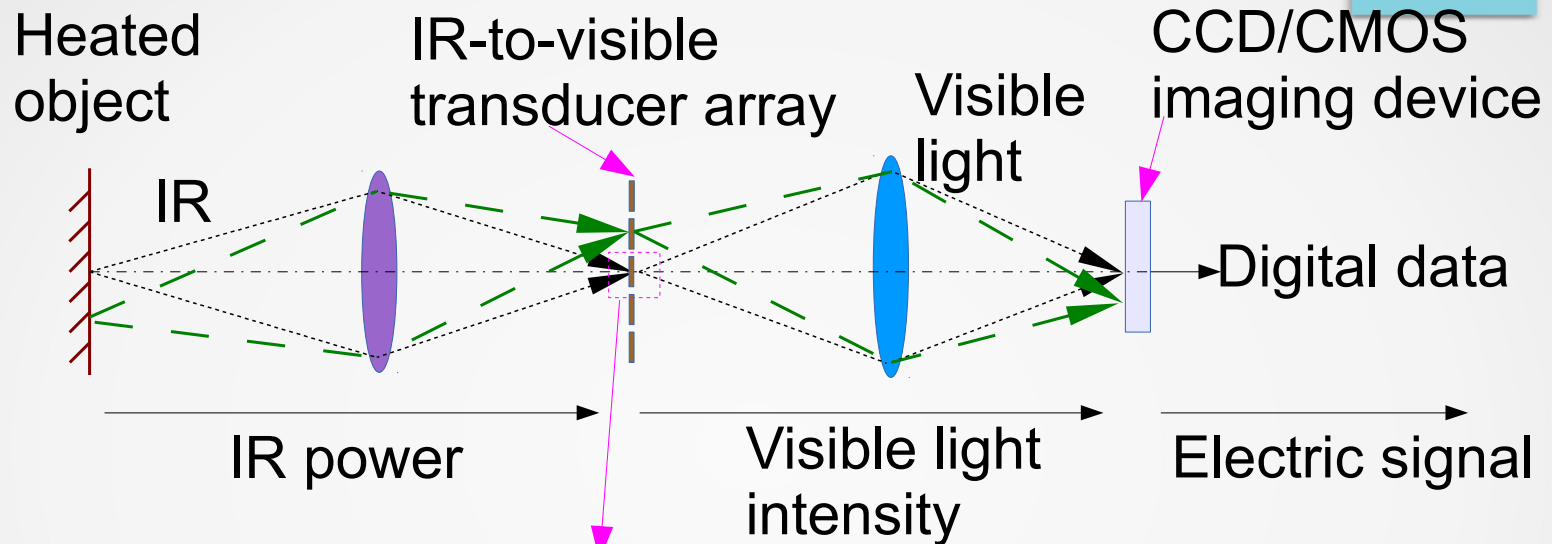
[1] <http://www.infrared.avio.co.jp/en/appli/heat-design.html>

[2] [http://www.ecoflow.go.jp/gallery/07/07\\_04.html](http://www.ecoflow.go.jp/gallery/07/07_04.html)

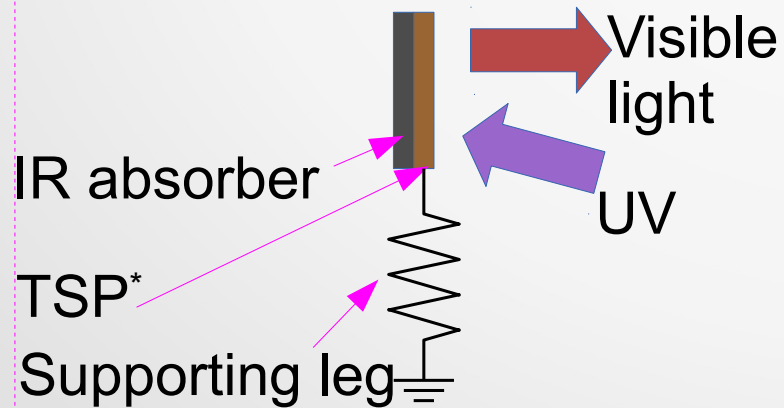
[3] <http://www5f.biglobe.ne.jp/~denken/camera.html>

[4] <http://www.ssc-inc.jp/heimannsensor/>

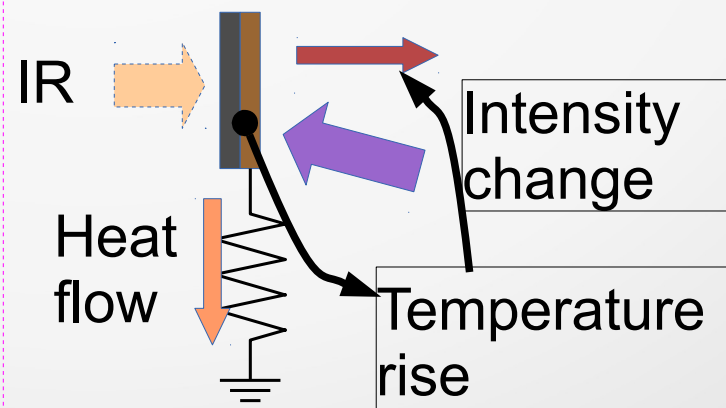
# Thermal imaging using IR-to-visible convertor



## Without IR irradiation

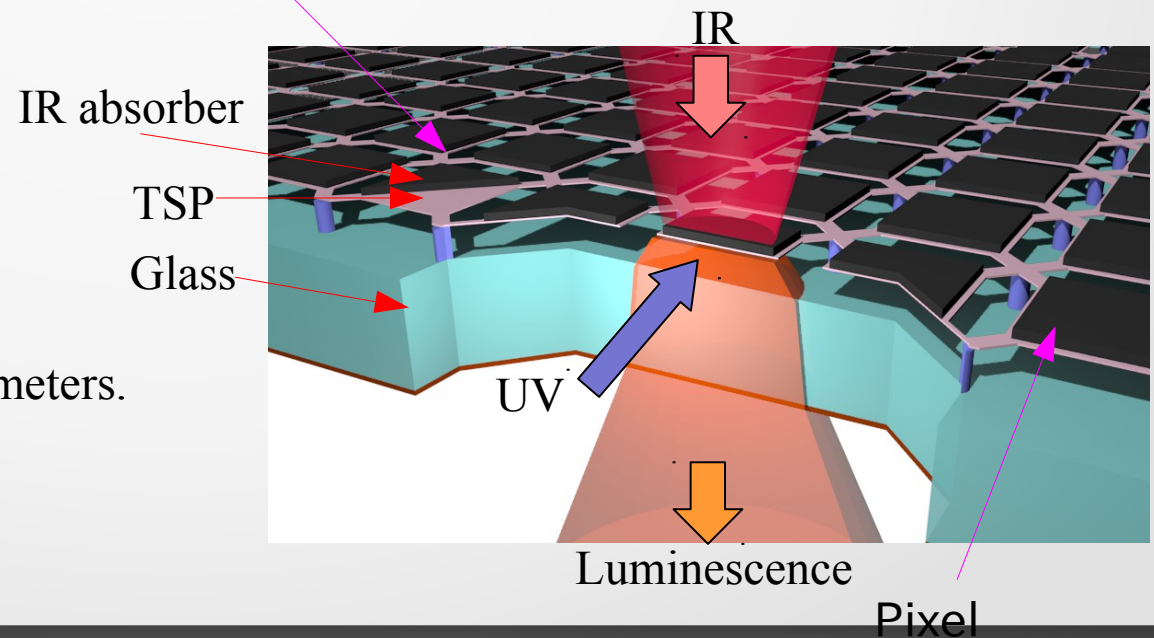
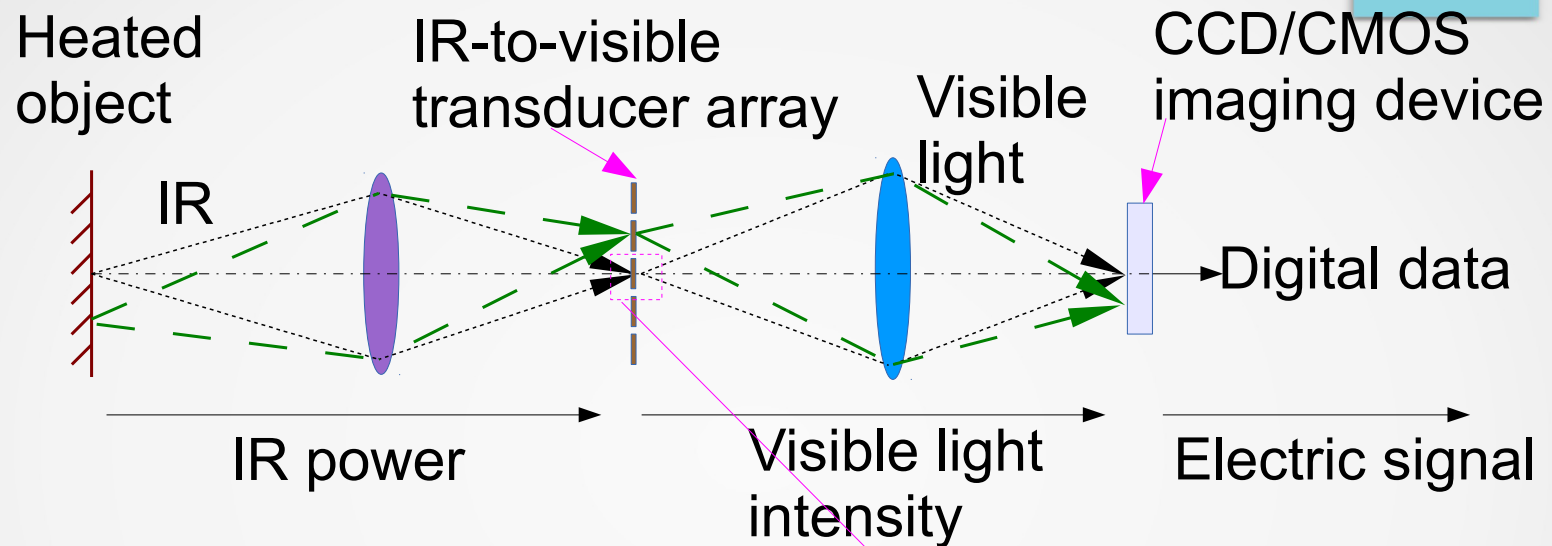


## With IR irradiation



\*TSP = Temperature sensitive paint

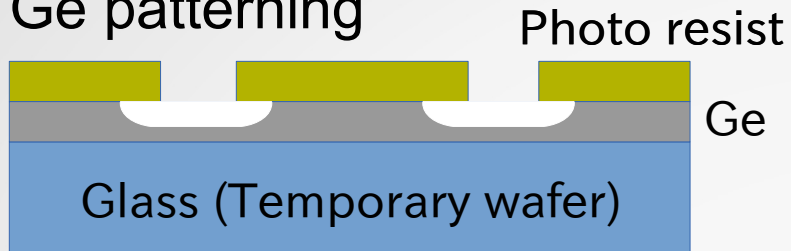
# Thermal imaging using IR-to-visible convertor



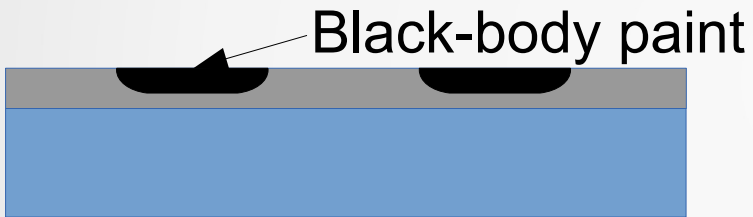
Easy to fabricate.  
Thermal resistance of each pixel  
is higher than that of conventional bolometers.  
→ Sensitivity can be increased.

# Fabrication (MEMS process)

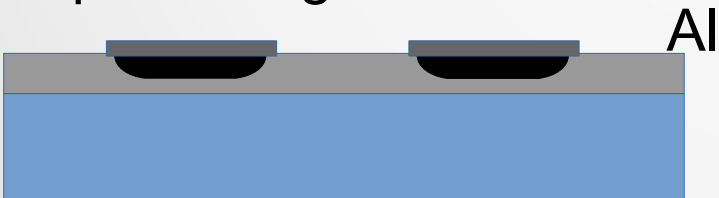
1. Ge patterning



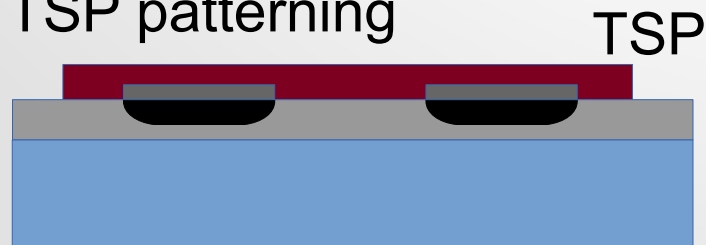
2. Black body paint filling



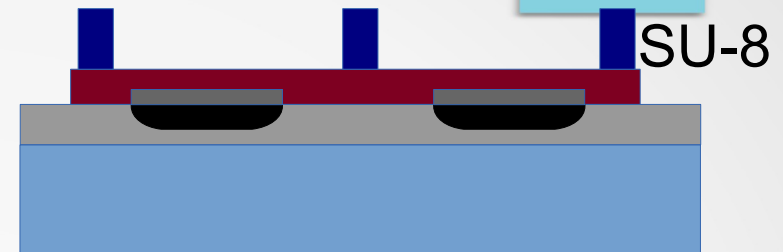
3. Al patterning



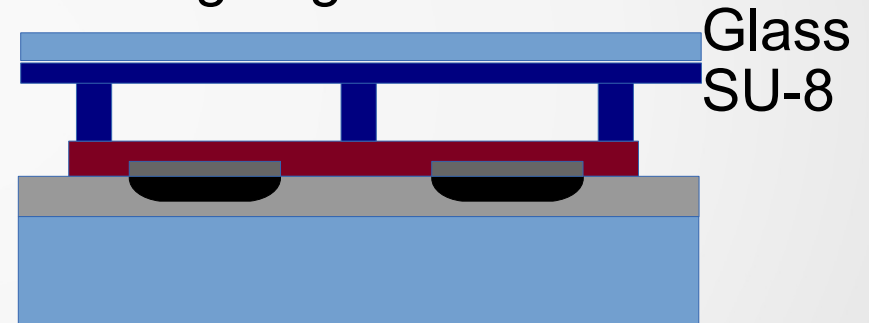
4. TSP patterning



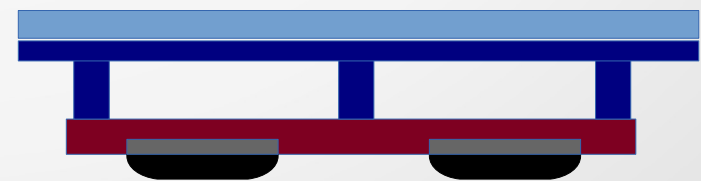
5. SU-8 patterning



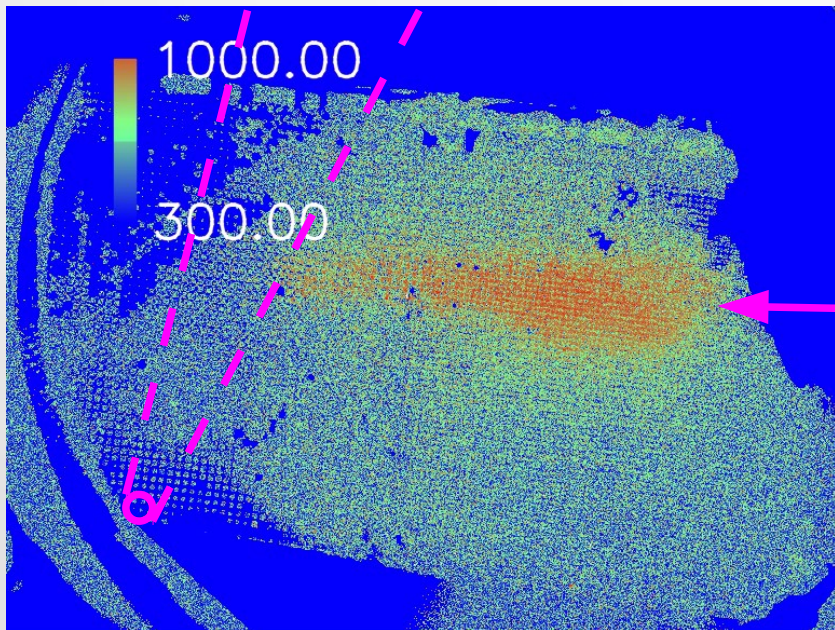
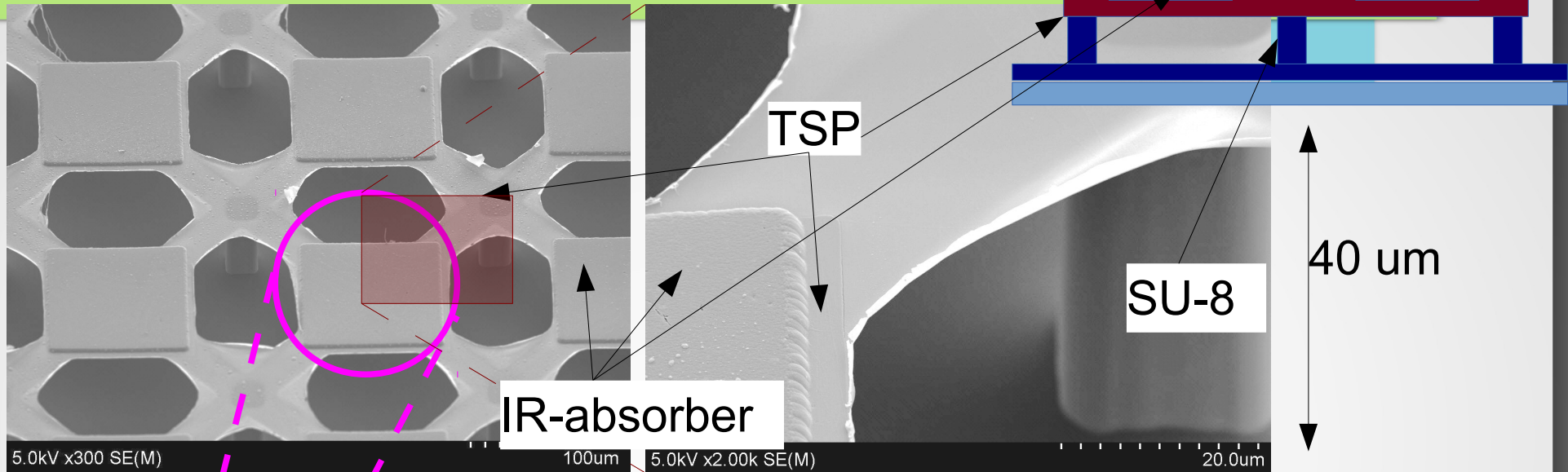
6. Bonding to glass substrate



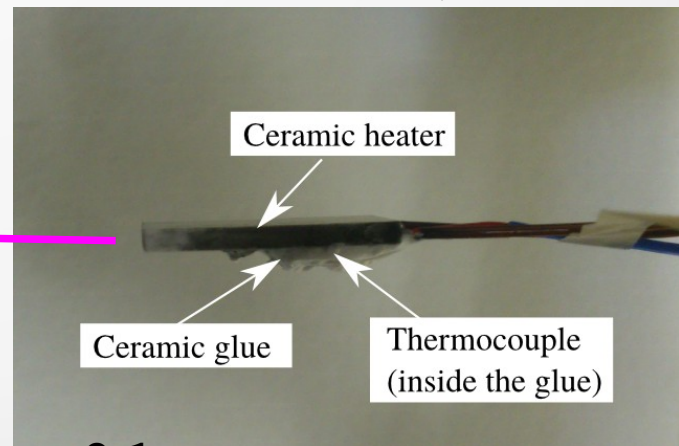
7. Release from the temporary wafer



# Thermal images



Observation object



Pixel size : 0.1 mm  
Minium 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  $\mu\text{m}$
- Temperature as small as 300°C could be observed
  
- Now, develop a new device for high performance