



Cellular Night Vision

French physicists have developed a thermal imaging technique that maps heat across a single cell

“We were initially inspired by night vision goggles – like you see in the movies – and it made us wonder if we could do the same thing with cells”, says Thomas Dehoux, lead researcher on the paper, published in *Applied Physics Letters* (1).

How does it work? A cell is placed on a nanometer-scale sheet of titanium, followed by heating of the other side of the sheet by a few degrees with a micrometric laser spot. When the

temperature increases, the titanium sheet dilates and creates a bulge. The cell on the other side of the sheet absorbs some of the heat, creating less of a bulge. A second laser detects the minute changes in the titanium sheet profile, recording how much heat the cell absorbs and hence its thermal properties.

“At first we were imaging cells using mechanical contrasts – variations in the mechanical properties of cells. But we were having trouble understanding our results so we hoped, with thermal contrasting, to gather more information and see if there was a correlation between unusual mechanical properties and unusual thermal properties,” says Dehoux.

Regarding possible applications for their thermal imaging technique, Dehoux says, “Our interest relates mostly to cancer research where it is suspected that cancer cells have a different

metabolism, and would therefore generate more heat than healthy cells.” The team is currently probing this idea, hoping to eventually detect cancerous cells by their thermal signature, and possibly even explore oncotherapy based on modifying cell thermal properties. But the applications don’t stop there; data from thermal imaging could also have uses in histological analyses, cryogenic preservation, hyperthermia therapy, and identifying new cell behavior.

The researchers hope to further develop the apparatus – ultimately combining the technology into a single microscope – with a focus on speed and the ability to image multiple cells. *WA*

Reference

1. R Legrand et al., “Thermal microscopy of single biological cells”, *Applied Physics Letters*, 107 (2015).