



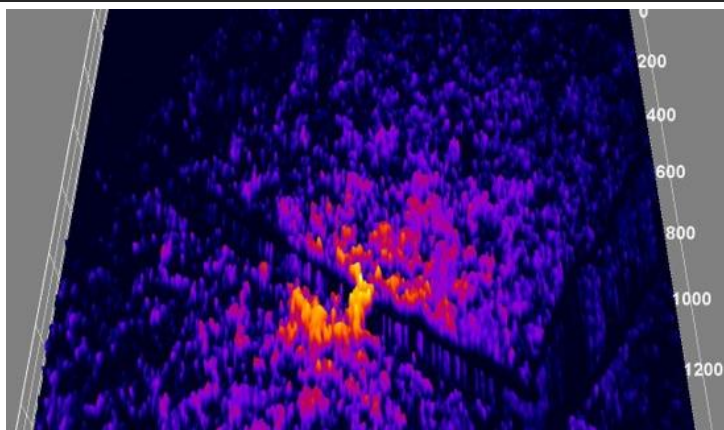
# NovaUCD

## Technology Licensing Opportunity



# Nanothermal Measurement Solution

- *Contactless temperature measurement of electronic circuits at the nanoscale*



### Opportunity:

Thermal dissipation is creating a bottleneck in modern electronic chips as there is a clear connection between the smallest nanostructures and highest useful clock rates.

Currently contactless temperature measurements, often by IR emission, are used to monitor advanced electronic circuits. However the usefulness of this method is limited by the spatial resolution of IR wavelengths.

A new contactless method has been developed to enable measurement of temperature of chip structure with unprecedented spatial resolution and accuracy in a non-destructive way.

### Method:

The method works on the basis of thermal expansion. The electronic current is modulated with a repetitive signal (e.g. a sinusoidal) and hence the extremely fast (picosecond scale) thermal expansion is also modulated with the same signal form (Joule/Ohmic heating).

### Key Features/Advantages:

- Ability to resolve at sub nm (same spatial resolutions as the AFM).
- Measurement of the temperature can be an absolute measurement as it can be related back to the thermal expansion which is accurately known for a given material.
- Non-contact, high sensitivity and dynamic (real-time).

### Value Proposition:

High spatial resolution temperature measurements of highly-integrated electronic circuits.

### Market:

AFM  
Processors, microcontrollers, detectors, fast communication electronics

### Lead Inventor:

Prof. Dominic Zerulla  
UCD School of Physics.

### IP Status/Publication:

Patent filed 2020  
UK Patent Application No. 2020854.2.



### Contact:

Dr Hugh Hayden  
Knowledge Transfer  
t: + 353 1 716 3725  
e: [hugh.hayden@ucd.ie](mailto:hugh.hayden@ucd.ie)

FUNDERS:

