A REAL SENSITIVE NANOCALORIMETRIC TECHNOLOGY TO STUDY ULTRA-THIN FILMS

Mecwins was founded in 2008, and has developed a commercially viable optical characterization instrument based upon proprietary technology and patents.

Mecwins offers the possibility to extend the proprietary technology to the thermal analysis of ultra high thin deposits (films, clusters …).

Scanning Laser Analyzer for Thermal Characterization of Ultra-Thin Films

NANO - CALORIMETER AT PICOGRAM SCALE

Nanocalorimeters are designed to perform nanoscale thermal analysis with high sensitivity on extremely small amounts of sample (nanograms, picoliters) under very fast operating rates. Reduced sample size means reduced sample consumption, which demands higher resolution and better thermal isolation. An optical technique has been recently developed to calibrate the thermal response of the chips, avoiding errors in the extrapolation from low to high temperatures. Although the use of nanocalorimetry started in the 1970s, nanocalorimetry is still considered as an emerging field. Traditional DSC requires relatively large amounts of test material, and thermal analyses on nanoscale samples are difficult.

Even more, traditional DSCs are limited to taking one measurement at a time, and a new sample must be loaded between each measurement. This severely limits the use of a traditional DSC in combinatorial studies at the nanoscale.

Mecwins has developed a sensitive **nanocalorimetric technology based on microcantilever** sensors: **SCALA cal**

Cantilevers can be used as precise thermometers/calorimeters by exploiting the bimetallic effect. If the cantilever beam is coated by a material having a different coefficient of thermal expansion than that of the material making up the cantilever itself, it will undergo a deflection as a result of temperature changes.

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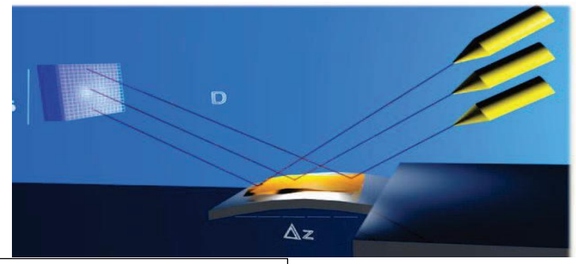
OPTICAL CHARACTERIZATION TOOLS FOR MEMS, BIOSENSING, STATIC AND DYNAMIC MODES, FREQUENCIES, VIBRATION MODE ANALYSIS, THIN FILMS RESEARCH, ETC…

A real sensitive nanocalorimetric technology to study ultra-thin films



Technical specifications of **SCALA cal** at a glance

- ✓ Very small sample consumption: up to 1 pg (reduction of test material of ten orders of magnitude with respect to conventional DSC)
- ✓ Extremely high sensitivity: Young's modulus with a sensitivity to variations of 100 parts per million.
- ✓ Processing speed: 10 cantilevers per second.
- ✓ Ultra-thin polymeric samples: ~10^{-13} g.
- ✓ Calorimetric Chamber
  - Temperature control from -10ºC to 250ºC
- ✓ LabView software environment:
  - Profile detection measurements
  - Single point deflection measurements at any point on the mechanical sensor
- ✓ Frequency measurements (with thermal and mechanical excitation)

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SCALA *cal*

SCALA *cal* is the ideal instrument for thermal characterization of ultra-thin films

The use of this bimaterial effect can be utilized to transform the cantilever into a sensitive calorimeter. The small size and heat capacity of micro-cantilevers makes them remarkable calorimeters with picojoule sensitivities and millisecond time resolution, as compared to conventional differential scanning calorimeters.