



	Experiment title: Development of Nanocalorimetric Accessory for Micro-focus Beamlines	Experiment number: MA-1466
Beamline: ID13	Date of experiment: from: 14.07.2012 to: 17.07.2012	Date of report:
Shifts: 9	Local contact(s): Emanuela Di Cola	<i>Received at ESRF:</i>

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Report:

Abstract:

A MEMS-based calorimeter designed for use on a synchrotron nano-focused X-ray beamline is described. This instrument allows quantitative DC and AC calorimetric measurements over a broad range of heating/cooling rates ($\leq 100,000$ K/s) and temperature modulation frequencies (≤ 1 kHz). The calorimeter was used for high-resolution thermal imaging of nanogram-sized samples subjected to X ray-induced-heating. For a 46ng Indium particle, the measured temperature rise reaches ca. 0.2K, and is directly correlated to the X-ray absorption. Thermal imaging can be useful for studies of heterogeneous materials exhibiting physical and/or chemical transformations. Moreover, the technique can be readily extended to 3D thermal nano-tomography

Reference:

Martin Rosenthal, David Doblas, Jaime J. Hernandez, Yaroslav I. Odarchenko, Manfred Burghammer, Emanuela Di Cola, Denis Spitzer, Anatoly E. Antipov, Leonid S. Aldoshin and Dimitri A. Ivanov. "*High-Resolution Thermal Imaging with a Combination of Nano-Focus X-ray Diffraction and Ultra-Fast Chip Calorimetry*". Journal of Synchrotron Radiation. **article in the press**