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New European project for understanding and managing heat transfer at the nanoscale

On December 17 and 18, 2013, the Centre for Thermal Sciences in Lyon (Lyon CNRS / INSA / Claude Bernard University Lyon 1) will organize the kick-off meeting of a new European project aimed at improving our understanding of thermal phenomena at the nanoscale. The project will gather about twenty partners in a field that is proving to be of paramount importance for many everyday technologies. The project is financed by the European Commission's 7th framework programme and coordinated by the CNRS.

Comprehending and managing heat transfer is crucial for modern technologies incorporating nanocomponents and nanostructured materials. Development, improvement and optimisation of systems in fields as diverse as microelectronics, micro- and nano-systems (MEMS/NEMS) and new energy-recovery or energy-conversion devices (e.g. thermoelectricity) all require thermal properties to be meticulously controlled at the micro- and nanoscales. A large number of industrial sectors are concerned. However, nanoscale heat transfer mechanisms are very different from those observed at the macroscopic scale and they remain little known: it is therefore crucial to study them in greater detail. To do so, today's tools and measurement techniques need to be significantly improved in order to become more reliable and reproducible. The QUANTIHEAT project seeks to provide a solid basis for "thermal nanometrology" over the next few years, by allowing sustained experimental effort and providing novel conceptual input in thermal physics and engineering.

Press visit to the laboratory

December 11 from 10h to 11h
CETHIL, La Doua
Bât. Sadi Carnot

A meeting with Dr Séverine Gomès, CNRS research scientist and project coordinator; with an illustration of the project by a laboratory visit.

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or +33 6 88 61 88 96

For this purpose and among other objectives, the QUANTIHEAT partners plan to define a common terminology for the various instruments used and to create reference materials and devices for calibration operations. The project will also enable new instruments to be developed for studying heat transfer at the ultra-local scale. This will be done in particular using scanning thermal microscopy, a technique derived from atomic force microscopy. In addition, multi-scale thermal models connecting the atomic scale to the macroscopic scale will be developed for interpreting all the phenomena that will be observed. New metrology tools will be applied to representative industrial materials to propose ways of improving their properties and/or their manufacturing processes. One of the project's specificities will be to propose measurement standards that will include traceability and reproducibility. As a result, QUANTIHEAT should help improve control of nanoscale thermal phenomena and promote the transfer of new thermal characterisation methods towards industry.

The consortium involved in the project gathers academic partners – physicists, experts in materials science, in modelling, experimentalists and microscopists-, and industrial partners including SME and companies



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developing characterization equipments, as well as National Metrology Institutes and micro- and nanofabrication platforms.

The project involves 21 partners from 9 European countries¹ for covering many of the various aspects of heat transfer. It is financed by the European Commission's 7th research framework programme for a period of four years. QUANTIHEAT is coordinated by Dr Séverine Gomès, a CNRS researcher at the Centre for Thermal Sciences of Lyon - (CETHIL, CNRS / Lyon INSA / Claude Bernard University Lyon1). The project will be officially launched in Lyon on December 17 and 18, 2013, in the presence of all participants involved.

Research Contact

Séverine GOMES | Centre de Thermique de Lyon | 04 72 43 64 28, severine.gomes@insa-lyon.fr

Communication contacts

CNRS Rhône Auvergne | Sébastien Buthion | T 06 88 61 88 96 | communication@dr7.cnrs.fr

¹ Centre National de la Recherche Scientifique, University of Lancaster, IBM Research GmbH, Laboratoire National de Métrologie et d'Essais, University of Glasgow, VTT Technical Research Centre of Finland, National Physical Laboratory, Thales Research and Technology, Czech Metrology Institute, PICOSUN Oy, Ecole Polytechnique Fédérale de Lausanne, Catalan Institute of Nanotechnology, Université de Reims Champagne-Ardenne, Ecole Supérieure de Physique et de Chimie Industrielles de la ville de Paris, Micro Resist Technology Gesellschaft für Chemische Materialien spezieller Photoresistsysteme mbH, Ecole Nationale Supérieure de Mécanique et des Microtechniques, Berliner NANOTEST und Design GmbH, CONPART As, NT-MDT Europe B.V., University Paris Descartes, Kelvin NanoTechnology