

# Colloquia 2018

Thursday 19 April 2018 – 3:00 pm

Laboratorio NEST  
Pisa, Piazza San Silvestro 12  
Nest seminar room

**Stefano Veronesi**

will give a seminar with the title:

## **“A sensitive calorimetric technique to study energy (heat) exchange at the nano-scale”**

### **Abstract:**

*Every time a chemical reaction occurs, an energy exchange between reactants and environment exists, which is defined as the enthalpy of the reaction. In the last decades, research has resulted in an increasing number of devices at the micro- or nano-scale. Sensors, catalyzers, and energy storage systems are more and more developed as nano-devices which represent the building blocks for commercial "macroscopic" objects. A general method for the direct evaluation of the energy balance of such systems is not available at present. Calorimetry is a powerful tool to investigate energy exchange, but it usually needs macroscopic sample quantities. Here we report on the development of an original experimental setup able to detect temperature variations as low as 10 mK in a sample of  $\square$  10 ng using a thermometer device having physical dimensions of 5x5 mm<sup>2</sup>. The technique has been utilized to measure the enthalpy release during the adsorption process of H<sub>2</sub> on a titanium decorated monolayer graphene. The sensitivity of these thermometers is high enough to detect a hydrogen uptake of  $\square$  10<sup>0</sup> moles, corresponding to  $\square$  0.2 ng, with an enthalpy release of about 23  $\mu$ J. The experimental setup allows, in perspective, the scalability to even smaller sizes.*

For information, please contact:

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