

BottomUp NANO TopDown through Physics curricula

Inspired by Nanoyou materials, pupils from 14 to 18 years old were involved in **experimental activities** with the aim to introduce nanoscience and nanotechnology not as a self standing chapter but as a cutting edge topic permeating the whole Physics curricula. They worked on new materials predicting, testing, analyzing data, and studying their possible applications. Results often challenged their „school“ Physics knowledge and introduced **new perspectives**.

School: Liceo Scientifico Sorbelli /
 ISIS Cavazzi, Pavullo(MO)
Country: Italy
Subject: Physics

N° of students involved: 60 (age 14-18)

Scientix Resources:
 • Nanoyou welcome pack
 • Science in school
 • Issue 17 Dec. 2010 School experiments at the nanoscale
 • Issue 10 Dec. 2008 Nanotechnology in school

Some examples:

- Measuring forces: friction, adhesion and biorubber properties
- Density calculations of usual materials compared with aerogel one
- Electrical resistance and QTC pills (rubber whose conductivity depends on applied pressure)
- Metals contraction and the counterintuitive behaviour of smart alloys due to atomic dislocation
- Magnetic fields visualization and ferrofluids properties
- Electromagnetic spectrum and light interaction with materials and surfaces: colloids, LCD crystals, aerogels.
- From optics to TEM: diffraction and seeing the „invisible“.

One of the main focus was the **role of nanotechnologies in sustainability:**

- Light transmission through nanocoated glasses and polymeric thin films against green house effect
- Superhydrophobicity and thermal insulating properties of new materials: aeroclay, aerogels
- Nanoporous materials for oil spilling containment and absorption
- Organic PV and Graetzel cells
- Hydrophobicity and selfcleaning surfaces: textiles, glass



The project involved the collaboration of firms and companies which willingly offered samples and of the University of Modena, Physics Department whose academic personnel and researchers offered their support and counselling.



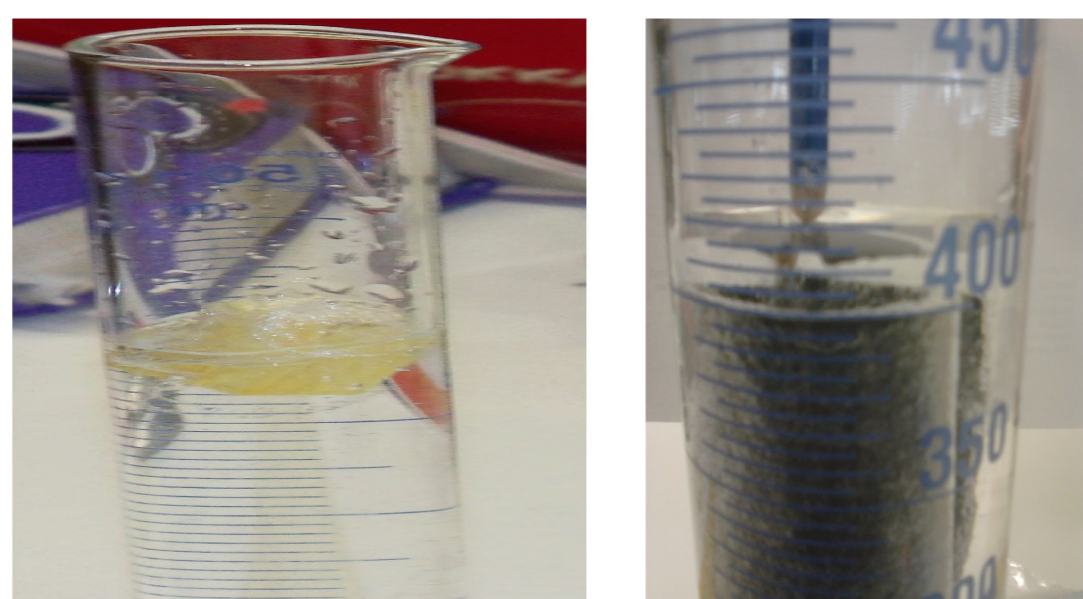
Experiments:



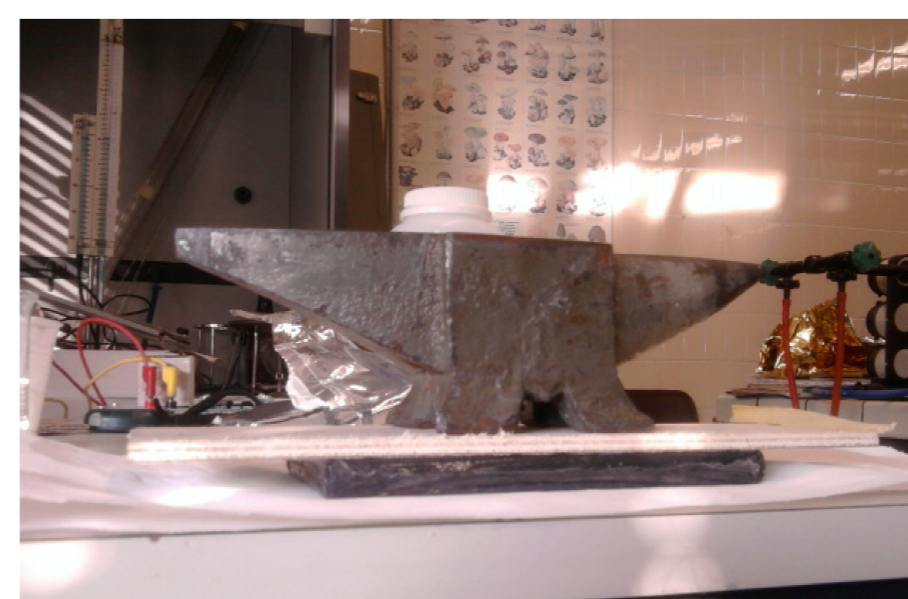
Studying hydrofobic surfaces: *lotus effect* and looking for contact angles in new building materials



Aerogels: As light as air?



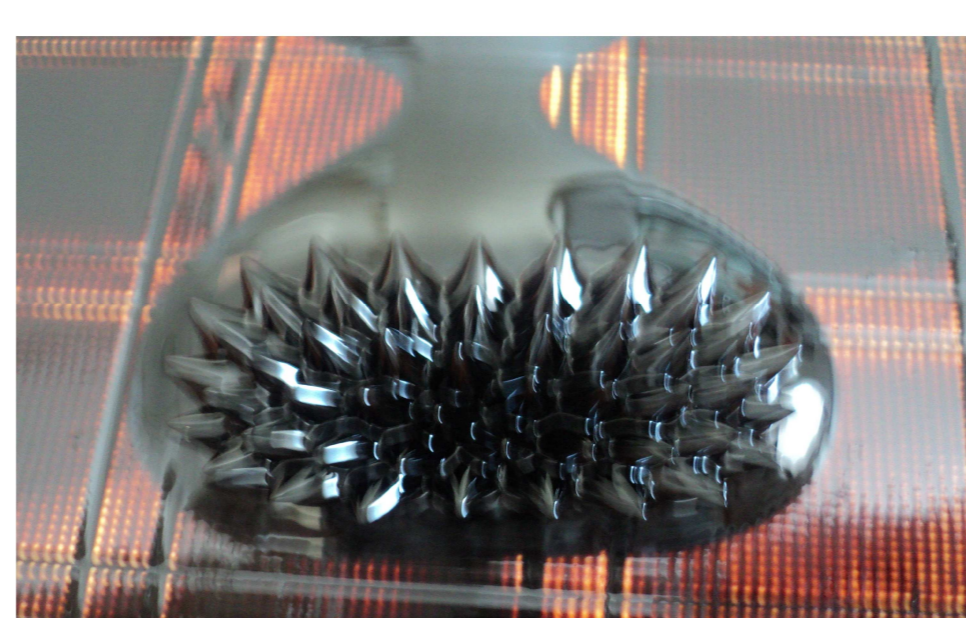
... density tests ...



... stress resistance and light transmittance

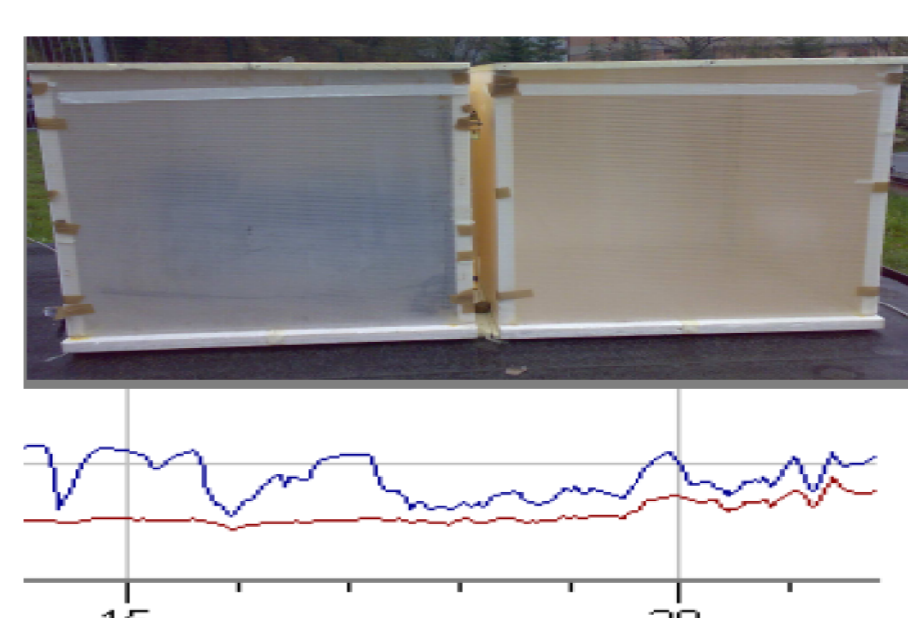


Heat conduction: evaluating aerogels as insulators with LCD sheets

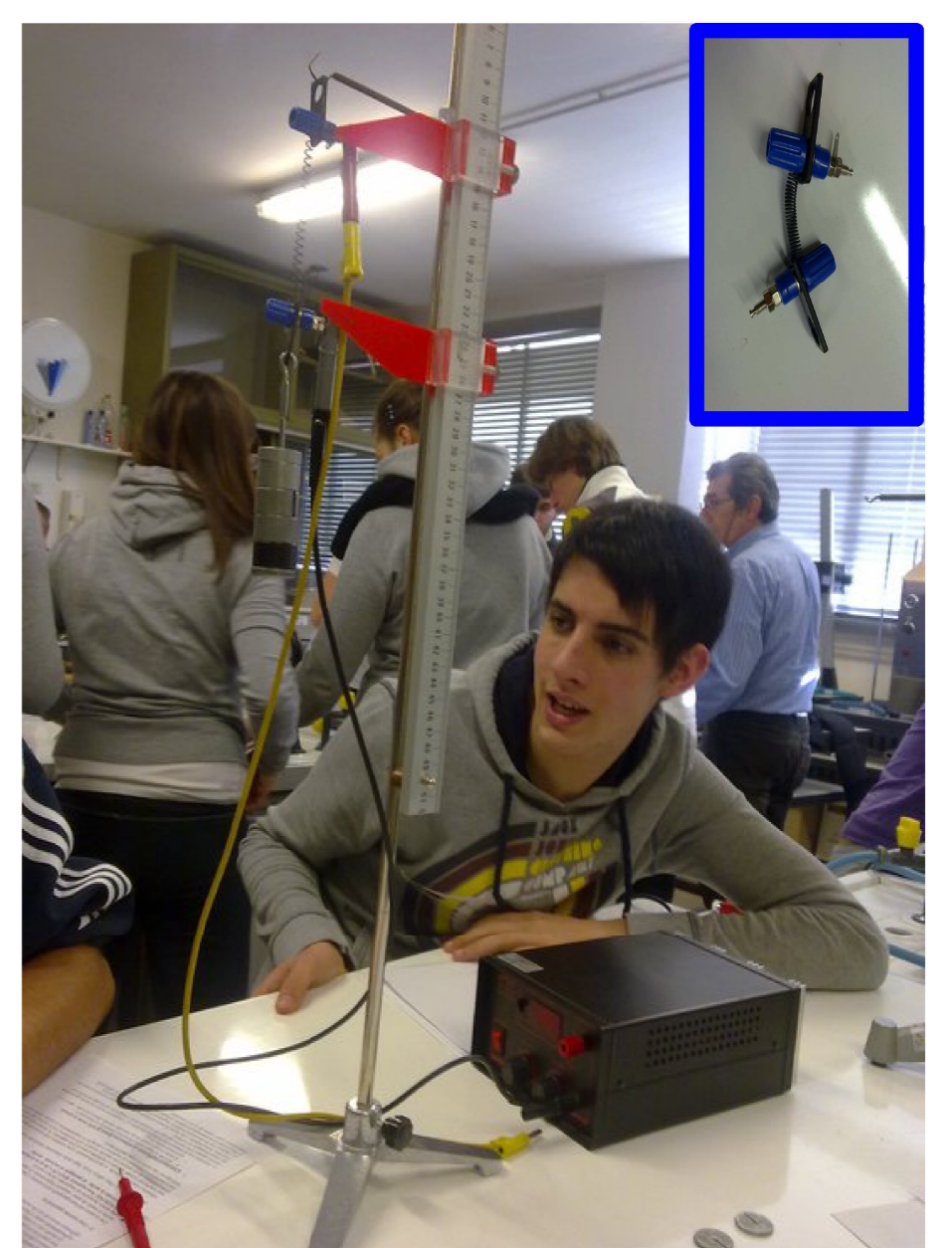


Ferrofluids: synthesis

Gecko effect: biorubber and its adhesive properties (measuring forces)



Polymeric thin film: against green house effect



Smart alloys: shape memory metals