School on Nanostructured Materials
Characterization by Synchrotron Light based Techniques

18th - 23rd November 2007. La Plata, Buenos Aires. Argentina

Characterization of nanostructures with XAFS

Gustavo Azevedo
Laboratório Nacional de Luz Síncrotron
Campinas, São Paulo, Brazil

X-ray Absorption Fine Structure (XAFS) spectroscopy is a well-established materials characterization technique, consisting on the analysis of the X-ray absorption coefficient as a function of energy around an atomic absorption edge. This spectroscopy has a number of unique features. Namely, XAFS is element-specific and provides information on both electronic and geometric structures, encompassing oxidation states, coordination symmetry, coordination numbers and interatomic distances. More importantly, XAFS is sensitive to the average local structure within a radius of ~ 1 nm around the absorbing atoms. Due to these characteristics, XAFS is ideally suited to the study of nanomaterials.

In this talk I will give a brief, but complete introduction to XAFS in an accessible level to graduate students. In the first part of the seminar both experimental and theoretical aspects of the technique will be approached, including the rudiments of data analysis and a presentation of the infrastructure available at LNLS for XAFS measurements. In the second part, a few examples of applications to nanoscale materials, including semiconductors, catalysts and magnetic materials, will be discussed.