

Condensed Matter

The aim of this group is the experimental and theoretical study of materials with complex phase diagrams (as a consequence of their close interrelationship between structural, magnetic and electronic properties), whose physical or chemical behavior have an academic and/or technological interest.

Among the main theoretical subjects it can be mentioned:

- Molecular dynamics simulations (in sulfur, water, fullerenes and organic crystals and liquids - Surface diffusion in semiconductors - Hard coatings).
- Statistical mechanics: Fluids (integral equations, density functional and application to lattice gases) - Complex systems (econophysics, game theory, soc, etc) - Phases with modulated disorder).
- Calculations of magnetic and electronic structure (transport of layered and granular systems), low dimensional magnetism (1- and 2D) - Non-collinear magnetism - Magnetic anisotropy in thin films - Simulation of protein structure.

And among the main experimental subjects:

- Low field magnetoresistance and phase separation in manganese based oxides.
- Structural studies on molecules with biological interest (small molecules and proteins).
- Mossbauer spectroscopy of soils, alloys, and magnetic interactions among ultrafine hematites.
- Synthesis and characterization of inorganic compounds (perovskites, manganites, high T_c superconductors and its precursors) and carboxylate complexes of lanthanides and transition metals.
- Effects of controlled defect introduction (by chemical substitution and irradiation) on transport properties.
- Polymorphism problems on pharmacological drugs and polymers.
- Environmental problems: retention of toxic metal traces onto inorganic and biological substrates (water remediation), analysis of atmospheric particles.
- Biological related problems (biomineralization, radiation probes).