Seminars visiting researcher – Alejandro Fernandez-Martinez

Lectures for PhD students (1h):

3 April 2024 – at 14.00 – aula Lucchesi

Synchrotron nanoscale characterization techniques for the Earth sciences

The Pair Distribution Function (PDF) technique, classically used to the study of liquids and amorphous materials, has seen a renewal interest due to the ability to collect quickly scattering patterns using 2D detectors at 4th generation synchrotron sources, with enough signal-to-noise ratio to be able to analyse the diffuse scattering coming from the disordered component of a material. This technique will be introduced and several examples in the field of mineral nucleation and growth, and of cement hydration, will be shown.

10 April 2024 – at 14.00 – aula Lucchesi

Mineral nucleation and growth in aqueous systems: unveiling the secrets of crystallization

In the last decade, the use of advanced characterization techniques at the nanoscale allowing to probe early stages of formation of minerals in supersaturated aqueous solutions has allowed the discovery of non-classical nucleation pathways. Here, an overview of old vs. new paradigms in the field of mineral formation will be given, presenting a state-of-the-art of the current physico-chemical understanding of precipitation phenomena.

19 April 2024 – at 14.00 – aula Lucchesi

Geochemistry and Mineralogy of Acid Mine Drainage (AMD)

AMD occurs in zones where pyrite formations are oxidized due to rock weathering, a phenomenon that is accelerated in the presence of mining operations. AMD waters are highly acidic, mobilizing metals and metalloids, among which many pollutants. These are present in many parts of the world, presenting important environmental concerns. Here, an overview of the phenomenon, and a detailed analysis using nanoscale techniques of the most important Fe and Al colloids formed in AMD, and their environmental relevance, will be presented.

Seminar for the department (1h):

11 April 2024 – at 10.00 – aula Lucchesi

Mineral colloids in acid mine drainage: from toxic elements to critical elements

The acid mine drainage present in the Rio Tinto site from the Tartessian times represent a legacy of metal pollution of unprecedented importance due to the large volume and high concentrations of toxic elements mobilized. Here, an overview of the phenomenon, and a detailed analysis using nanoscale techniques of the most important Fe and Al colloids formed in AMD, and their environmental relevance, will be presented. Moreover, the acidity of AMD waters facilitates the mobilization of rare earth elements and valuable metals like copper, potentially paving the path for economically viable site restoration efforts.