

# Ph.D. programme in Materials Science and Nanotechnology Ph.D. programme in Chemical, Geological and Environmental Sciences

**April 3, 2019 – 3.30 p.m.**

**Seminar room - Department of Materials Science U5**

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## Surface Analytical Methods Overview and applications to Failure Analysis

This seminar examines three widely used surface analytical techniques – X-ray photoelectron Spectroscopy (XPS/ESCA), Auger Electron Spectroscopy (AES) and Static Secondary Ion Mass Spectrometry, commonly known as ToF-SIMS – with the aim to familiarize the audience with their practical application in science and technology.

The three techniques mentioned above use physical means to stimulate the emission of characteristic signals from the surface of solid materials. They are among the most commonly used in surface analysis.

We will examine the basics of:

- (1) Electron stimulation from a surface via incoming photons (XPS) or electrons (AES). This part will also consider and compare other analytical methods such as Energy Dispersive X-ray spectroscopy (EDS) and how they differ from XPS and AES.
- (2) Ion stimulation from surfaces, comprising methods that fall under the name of Secondary Ion Mass Spectrometry (SIMS). We will focus on Static SIMS (essentially, Time of Flight) and briefly consider its characteristics, instrumentation and quantitative aspects.

All three methods lend themselves to analysis of subsurface layers via depth profiling techniques, which will be discussed. We will also mention a new hybrid method (PiFM, Photo Induced Force Microscopy) that incorporates mechanical/topographical information (Atomic Force Microscopy: AFM) with light absorption spectroscopy (IR).