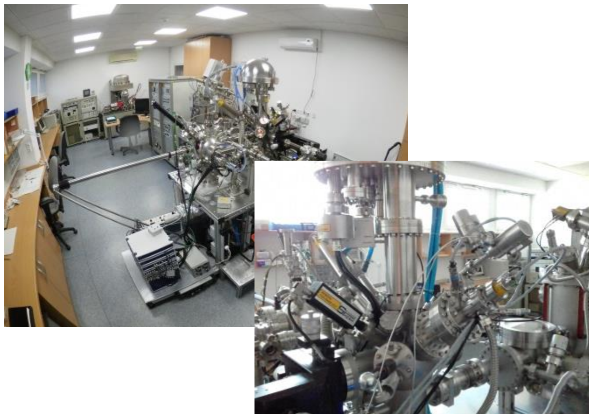
Determination of topmost atomic layer composition

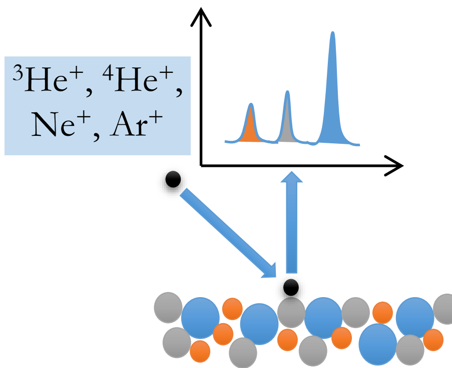
Preface

Low-Energy Ion Scattering (LEIS) is an analytical tool that provides information on the atomic composition of the sample surface, when noble gas ions are used as projectiles. It is one of the most surface sensitive materials characterization techniques. The information on the surface composition is originated from the signal of backscattered ions, typically from 100 eV up to 3 keV He^+, Ar^+ or Ne^+, makes possible to determine the composition exactly of the topmost one atomic layer.

Infrastructure



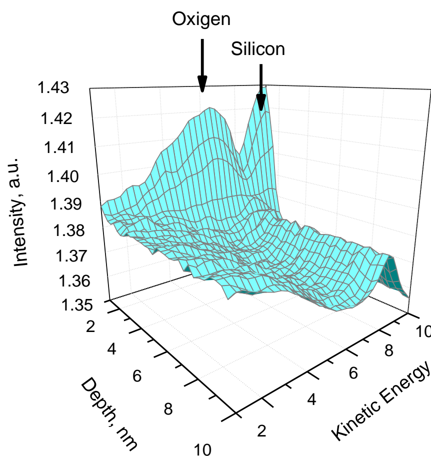
X-Ray Photoelectron Spectrometer (XPS) with ion gun for Low-Energy Ion Scattering measurements



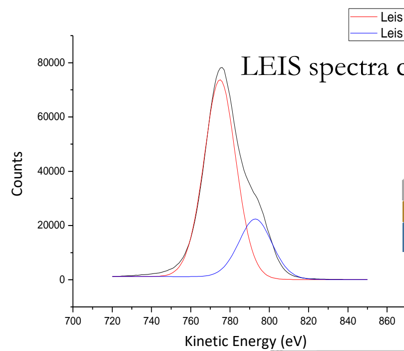
After interaction of the ions with the atoms of the surface the scattering effect takes place, the energy of scattered ion is measured by spectrometer.

This technique allows direct observation of hydrogen atoms on the surface. Comparing to the XPS method the LEIS gives information only from the first atomic layer of the sample surface.

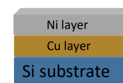
Example



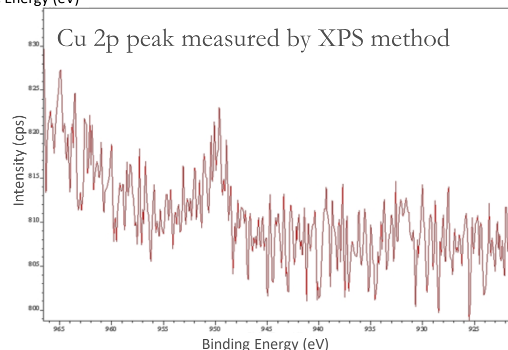
LEIS depth profiling on Si (111) wafer by mixture of He and Ar gas



LEIS spectra collected form [Ni/Cu//Si substrate] sample after annealing



In comparison with XPS the LEIS signal provide higher sensitivity



Cu 2p peak measured by XPS method

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