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The power (and limitations) of ion beam analysis in materials science

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The last decades, ion beam analysis secured a prominent position in materials science for investigating the compositional depth profile, the concentration and lattice site of impurities, crystal defects, etc. Studies of thin film reactions, kinetics, doping of semiconductors, etc., have significantly benefited from ion beam techniques such as Rutherford backscattering spectrometry or particle induced X-ray emission. Throughout the years, the demands with respect to sample analysis have become more and more stringent, thus challenging ion beam techniques in terms of sensitivity, resolution and accuracy.

In this lecture, I will briefly review the essentials of ion beam analysis, and subsequently illustrate the capacities – and the limitations – with a selected set of classical and more challenging examples.