

## TABLETOP SPECTROMETER FOR GRAZING INCIDENCE XRF

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Secondary ion mass spectrometry (SIMS) is routinely used for determining profile shapes, junction depths, and doses of dopants in Si wafers. However, in case of ultra shallow junctions (USJ) SIMS is going towards its intrinsic limits. Whereas the depth resolution and quantification in the deeper regions are still sufficient with SIMS, the native oxide-induced matrix effects are limiting factors for the technique if dose and distribution in the first nanometres are required.

Therefore a more complete characterization of USJ, as demanded by microelectronics technological nodes will require the application of different complementary techniques such as Medium Energy Ion Scattering, Scanning Transmission Electron Microscopy, Spectroscopic Ellipsometry as well as Grazing Incidence X-ray Fluorescence Analysis (GIXRF). The development of the mentioned techniques and the understanding of their complementarity for USJ analysis will be the task of a research activity within the running EC project ANNA (European Integrated Activity of Excellence and Networking for Nano and Micro- Electronics Analysis). Within the frame of this activity the X-ray group of the Atomic Institute develops GIXRF as a laboratory source driven tool for USJ analysis. The technique relies on the measurement of fluorescence signals at various incidence angles of the exciting X-ray beam. As the penetration of the primary X-rays becomes larger as a function of increasing incidence angles, GIXRF provides information on the total implanted dose in the substrate material. Since GIXRF is very sensitive in the first few nanometres it delivers satisfactory results for sample depths where SIMS has its drawbacks.

To successfully accomplish GIXRF analyses a tabletop measuring chamber is currently under development.

In the present work the design as well as the current status of the prototype will be presented. Hardware and software requirements to meet the demands of depth profiling with GIXRF will be discussed. Moreover first results obtained on As doped Si wafers will be presented.