

XRF Related Activities at the IAEA Nuclear Science and Instrumentation Laboratory

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Through its Nuclear Science Programme the IAEA carries out activities to assist and advise the its Member States in assessing their needs for capacity building, research and development in the nuclear sciences, as well as in supporting the Member States' activities for deriving benefits in specific fields. Within the subprogram *Accelerators, nuclear spectrometry and allied instrumentation* the IAEA has responded to Member States' needs by implementing programmatic activities that provide forums to exchange information on new trends and applications in x-ray spectrometry techniques. The activities of the Nuclear Science and Instrumentation Laboratory (NSIL) also include support to the IAEA Technical Cooperation Program projects design and implementation, as well as by providing training, conducting research to develop and improve x-ray spectrometry techniques, and offering analytical services to help and strengthen Member States' Laboratories.

During the last 20 years, the NSIL has contributed to capacity building (knowledge and expertise) in the effective utilization of EDXRF spectrometry using a variety of laboratory and portable instrumentation including radioisotope, direct/filtered x-ray tube, secondary target, total reflection and polycapillary focused x-ray excitation. NSIL has a long lasting cooperation agreement with the Laboratory for Ion Beam Interactions of Ruđer Bošković Institute (Zagreb, Croatia), where an IAEA end-station is available for PIXE/RBS measurements. More recently, the NSIL installed an ultra-high vacuum chamber (UHVC) at the XRF beamline of Elettra Synchrotron (Trieste, Italy) within the framework of a collaboration agreement. The UHVC has a multipurpose manipulator allowing performing different x-ray emission and absorption techniques, including grazing incidence XRF (GIXRF), total reflection XRF (TXRF), x-ray reflectometry (XRR) and x-ray absorption near-edge structure (XANES), among others.

The different x-ray spectrometry techniques have been applied to a wide range of topics, including environmental problems, plant breeding, soil erosion, food traceability and safety studies and for the characterization of advanced materials and cultural heritage objects. NSIL also provides advice on Quality Management and Quality Control for laboratories using x-ray fluorescence in their analytical practice, including the organization of proficiency test exercises free of cost for the participants.