

Training Workshop on Ion Beam Analysis Techniques

**Ruder Bošković Institute
Zagreb, Croatia**

23 – 27 April 2018

Ref. No.: EVT1701650

SUMMARY REPORT

Introduction:

The workshop was organized by Mr Roman Padilla-Alvarez (NAPC-NSIL) with the support of several collaborators from Ruder Bošković Institute. The workshop consisted of lectures and discussions on fundamentals of Ion Beam Analysis techniques, including Particle Induced X-ray Emission (PIXE), Rutherford Backscatter Spectrometry (RBS), Particle Induced Gamma Emission (PIGE) and Elastic Recoil Detection Analysis (ERDA), and to nurture and further develop the community and network of scientists and technicians utilizing accelerator based ion beam techniques. The list of topics covered and the names of the lecturers are provided in detail in Annex 1, Agenda of the Training Workshop. The objectives of the Training Workshop were communicated to TC relevant projects as to contribute to some of their needs for training.

The provided lectures were of excellent quality in content and methodological outline, and the discussions led were very productive for the participants.

Participants agreed that the objectives of this workshop were met, and in particular:

- The information provided during the workshop will contribute to improve their knowledge on Ion Beam Analysis techniques.
- Having access to accelerator facilities would allow the participants to incorporate IBA techniques to their research projects

The participants suggested some future actions to the IAEA, namely:

- To continue organizing Training Workshops on nuclear spectrometry techniques including both, laboratory and accelerator based techniques, and applications in different fields.
- To foster the presentation of concepts and the development of technical cooperation projects involving the use of accelerator based techniques in developing Member States, including regional projects.
- To coordinate CRPs that would foster the access of investigators from IAEA Developing Member States to accelerator facilities.

Evaluation of organization:

The Workshop was attended by nine participants from Burundi, Cuba, Czech Republic, Italy, Kenya, Senegal, Serbia, Ukraine and Zimbabwe. Two participants (Ghana and Sudan) that were originally approved to attend the workshop could not participate because of not obtaining their visas.

The costs of the Workshop were optimized by not recruiting external experts. Most of the provided lectures were given by Ruđer Bošković Institute staff, as an in kind contribution to the NSIL project implementation in the framework of an existing collaborative agreement. It can be said that all participants were recipients of knowledge. Two of the participants were from Regional TC project RAF7016 and one from project RLA7023. These projects aim at studying the composition of air particulate matter for source apportionment studies, for which the use of IBA techniques is a convenient alternative.

The general attendance to the sessions exceeded 90 % and the discussions were attended by all the participants.

Annex 1: WORKSHOP AGENDA, Training Workshop on Ion Beam Analysis Techniques
23 – 27 April 2018, Laboratory of Ion Beam Interactions, Institute Ruder Boskovic, Zagreb, Croatia

	Monday 23	Tuesday 24	Wednesday 25	Thursday 26	Friday 27
9:00-10:45	OPENING CEREMONY Welcome: Mr Milko Jaksic ¹ IAEA NSIL support to introduction of nuclear spectrometry techniques <i>Mr Roman Padilla</i> ²	LECTURE 3: Laboratory for ion beam interactions: Accelerators and available beam lines <i>Mr Tonči Tadić</i> ³	Practical exercise 1: Elemental analysis using PIXE- RBS-PIGE Calibration	Practical exercise 1 (cont.): Drafting method validation report of PIXE-RBS-PIGE	Group Discussion 3: Discussion of results obtained in practical exercises <i>Moderator: Mr Roman Padilla</i>
10:45-11:00	<i>Coffee Break</i>				
11:00-12:20	Introduction of Participants: institutions, facilities, research interests, motivation to attend the workshop	Visit to the Laboratory of Ion beam interactions Guide: <i>Mr Tonči Tadić</i>	Practical exercise 1 (cont.): Elemental analysis using PIXE- RBS-PIGE Measurement of Reference materials for method validation	Practical exercise 1 (cont.): Drafting method validation report of PIXE-RBS-PIGE	LECTURE 6: Forthcoming CRP on facilitating access to accelerators <i>Mr Roman Padilla</i>
12:20-14:00	<i>Lunch Break</i>				
14:00-15:30	LECTURE 1: Overview of Ion Beam analysis techniques: Principles and examples of application Mr Milko Jaksic	LECTURE 4: RBS: Rutherford Backscatter Spectroscopy: Fundamentals and applications <i>Mr Georgios Provatas</i> ⁴	Practical exercise 1 (cont.): Elemental analysis using PIXE- RBS-PIGE <i>Measurement of Reference materials and method validation</i>	Practical exercise 1 (cont.): Drafting method validation report of PIXE-RBS-PIGE	Round Table: Course achievements, challenges and future actions <i>Mr Roman Padilla</i>
15:30-15:45	<i>Coffee Break</i>				
15:45-17:15	LECTURE 2: PIXE: Particle Induced x-ray Emission: Fundamentals and applications <i>Ms Ivančica Bogdanović Radović</i> ⁵	LECTURE 5: NRA & PIGE: Particle Induced Gamma emission: Fundamentals and applications <i>Mr. Georgios Provatas</i>	Practical exercise 1 (cont.): Elemental analysis using PIXE- RBS-PIGE Measurement of Reference materials and method validation	LECTURE 6: ERDA: Elastic Recoil Detection Analysis Fundamentals and applications Mr Georgios Provatas	CLOSING CEREMONY AND FAREWELL

¹ Dr Milko Jaksic, Head, Division of Experimental Physics, Institute Ruđer Bošković, Zagreb, Croatia

² Dr Roman Padilla Alvarez, Nuclear Instrumentation Specialist, NSIL, IAEA, Vienna, Austria

³ Dr. Tonči Tadić, Senior Scientist, Laboratory for ion beam interactions

⁴ Dr Georgios Provatas, Post-doctoral Scientist, Greece

⁵ Dr Ivančica Bogdanović Radović, Senior scientist, Laboratory for ion beam interactions

