IAEA
International Atomic Energy Agency

INTERNATIONAL ATOMIC ENERGY AGENCY (IAEA)

Technical Meeting on
Nuclear spectrometry instrumentation for 2D and 3D imaging applied to characterization of materials of potential importance for nuclear power sector

30 September - 4 October 2013, IAEA Headquarters, Vienna, Austria

INFORMATION SHEET AND CALL FOR PAPERS

BACKGROUND

Over the last years considerable progress has been observed in the development and applications of nuclear instrumentation and associated analytical methodologies for 2D and 3D imaging. The characterization of materials using these techniques improved considerably and new applications became possible in support of applied research, teaching and education in nuclear science and technology, industry, environmental pollution monitoring, food and agriculture, human health and study of cultural heritage, among other fields. Many IAEA Member States have expressed their interest in launching nuclear power programmes which would generate additional interest and needs in the field of characterization of special materials.

The possibility of using different interactions of beams of radiation or particles with the matter have allowed performing inspection of materials and reconstruction of features in 2D and 3D images with improved spatial resolution. A wide range of possible applications include, but are not limited to, the following:

- X-ray attenuation radiography, complemented with neutron absorption or scattering have been used largely for 2D imaging. Advanced systems, comprising scintillation plates, optic guides and CCD cameras have improved the imaging resolution;
- SEM-EDS, μ-PIXE and μ-XRF (using both, laboratory or intense synchrotron sources for excitation) are commonly employed to create 2D images representing the surface distribution of elements with sub-micron to several tens of microns lateral resolution;
- Micro X-ray absorption tomography and confocal μ-XRF allow to reveal 3D density changes or elemental distribution in small volume samples, respectively;
- Phase-Contrast X-ray Imaging and Tomography complement absorption contrast techniques, and highlights edges and internal boundaries of a sample. For low low-density materials, which do not absorb X-rays sufficiently to form a conventional X-ray absorption image, the technique is especially useful;

- Time-of-Flight Elastic Recoil Detection Analysis is a powerful method for depth profiling of light and medium mass elements in near surface layers of material. Ion-induced Electron Emission (IEE) ERDA has been tested for the 3D analysis of near surface, offering a sub-micrometre depth resolution;

- Three-dimensional transmission electron microscopy (3D-TEM), effectuated by multiple imaging of a sample combined with image analysis, offers a new approach in materials science to obtain 3D information of complex solid materials. In SEM, Electron backscatter diffraction (EBSD, also known as backscatter Kikuchi diffraction BKD) is used to examine the crystallographic orientation of many materials; and

- Neutron scattering techniques remain a vital resource for the structural investigation of condensed matter, including the solution of structural problems in the technical sciences or industrial developments. Neutron scattering techniques are used to reveal information at atomic and inter-distance structure with a wide range of modalities, including Thermal neutron scattering, Neutron Time of Flight (TOF) scattering and neutron diffraction, among others.

A Technical Meeting is planned to highlight, review and discuss issues related to the current status of nuclear spectrometry instrumentation for 2D and 3D imaging, including practical guidelines for the effective utilization in developing Member States. The following topics are expected to be included in the programme:

- State-of-the-art instrumentation, developments and relevance for improved performance of the techniques;
- Analytical methodologies and applications;
- Role of national and international collaboration to provide access to analytical facilities; and
- Role of the IAEA in support of the developing Member State activities to effectively apply nuclear instrumentation for 2D-3D imaging.

OBJECTIVES

To review the relevant experience and current status of nuclear instrumentation and methods for 2D-3D characterization of materials and to prepare a report/guidelines for the effective utilization in developing Member States, including technical and managerial requirements and possible role of the IAEA.

PARTICIPATION

The Meeting is targeted for professionals working on the development and applications of nuclear instrumentation and associated analytical methodologies for 2D and 3D imaging in support of characterization of materials. A person will be eligible to participate only if nominated by the Government of an IAEA Member State (Ministry of Foreign Affairs or National Atomic Energy Authority) or by an Organisation invited to participate. Nomination for participation (Form A) should be received by the IAEA not later than **16 August 2013.** The participant should be involved in the field of development/use of nuclear instrumentation and methods for 2D-3D characterization of materials. *A contribution from the participant in the form of a short abstract covering his/her work relevant to the objectives of the meeting will be necessary for consideration for participation.*

The abstract should be prepared according to the following instructions:

1) Page size: A4 (21 cm by 29.7 cm) – vertical orientation;

2) Margins: 25mm all around; and

3) Layout:

- Title: single-spaced, 14-point size, Times New Roman Font (TNR), bold;
- Authors: single-spaced, 12-point size, TNR Font;
- Affiliation: single-spaced, 12-point size, TNR Font, italic;
- Text: 1.5 spaced, 12-point size, TNR Font; and
- Length: one page.

Important: *When sending* ***Microsoft Word files****, authors should use True Type Embedded Fonts (to save the file, click Tools, then Options, and tick Embed True Type fonts. This will help to prevent change of fonts when the file is read in a different system, as is expected in most of the cases). If possible, please also send your abstract in PDF format.*

FINANCIAL SUPPORT

The IAEA is generally not in a position to bear the travel and other costs of designated participants in the meeting. Limited funds are, however, available to help cover the cost of participants from Member States eligible to receive technical assistance under the IAEA's technical cooperation programme. Such assistance can be offered, upon specific request, to one participant per country provided that, in the IAEA's view, the participant will make an important contribution to the meeting. The application for financial support should be made at the time of designation of the participant.

It should be noted that compensation is not payable by the IAEA for any damage to or loss of personal property. The IAEA also does not provide health insurance coverage for participants in meetings, workshops or training courses or for consultants. Arrangements for private insurance coverage on an individual basis should therefore be made. The IAEA will, however, provide insurance coverage for accidents and illnesses that clearly result from any work performed for the IAEA.

If your Government should wish, in addition, to appoint one or more observers to assist and advise the designated participant in the meeting, their name(s) should reach the IAEA by **16 August 2013**. In accordance with the established rules, Governments are expected to bear the cost of attendance of any observers they may send to IAEA meetings. Compensation is not payable by the IAEA for any damage to or loss of observers' personal property or for illness, injury or death occurring while travelling to or in connection with their attendance at IAEA meetings.

As subsequent correspondence will be exchanged directly between the Scientific Secretary for the meeting, Mr [Roman Padilla-alvarez] of the Division of Physical and Chemical Sciences, and the participants, the full names and complete contact details (including postal address, telephone/fax numbers, and email address) of designated participants should be provided.

MEETING FORMAT

To facilitate proceedings, participants are invited to contribute an oral presentation on subject relevant to the scope and objectives of this meeting. Participants should submit an abstract of their proposed presentation along with their nomination. The official language of the meeting is English. No interpretation will be provided. It is expected that the meeting will start at 9:00 on Monday, 30 September and conclude by 16:00 on Friday, 4 October 2013.

The outputs of discussions will be recorded for possible dissemination to Member States as an IAEA technical publication. Contributors of material to be included in the Agency proceedings are required to assign all copyrights or rights to publish to the Agency. Please complete and sign the Form B and send it to the IAEA Scientific Secretary by post or email. The authors should ensure that material they make available for possible publication by the IAEA does not include copyrighted material or other impediments for reproduction.

LOCAL ARRANGEMENTS

It is the responsibility of all participants to make their own travel arrangements to/from Austria. Detailed information on accommodation, local transport to/from the meeting venue, and other organisational details, will be sent to all designated participants well in advance of the meeting.

VISA

Designated participants who require a visa to enter Austria should submit the necessary application to the nearest diplomatic or consular representative of Austria well in advance of entry. An official letter of invitation will be issued to all designated participants by the IAEA Scientific Secretary.

DEADLINES

- **16 August 2013**: Submittal of requests to the IAEA for participation and financial support close; and
- **2 September 2013:** Participants informed of their acceptance of participation and request for financial support.

IAEA SCIENTIFIC SECRETARY

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