Training package on non-destructive alpha spectrometry

Non-destructive alpha spectrometry is a method in which the samples or smooth surfaces of different objects are measured without radiochemical sample processing. The training package is intended for specialists working in the field of radionuclide analytics such as laboratory staff, researchers, workers responsible for radionuclide measurements, emergency responders etc. The package gives new perspectives to alpha spectrometry, i.e. to measure alpha spectra with good energy resolution from different types of sources and even at ambient air pressure. The source can be a radiochemically processed sample, an air filter, a swipe or any flat and smooth surface. After completion of the course, the trainee understands the motivation, background and basics of non-destructive alpha spectrometry, and is capable to apply the method in the home institute.

Features

- Modular
- Tailoring possible according to the needs of the trainees
- The training is composed of
  - presentations/lectures
  - computer exercises
  - use of equipment
  - demonstrations
- May contain installation of different programs such as
  - AASI (simulation program)
  - AASIFIT (simulation and analysis program)
  - ADAM (analysis program)
  - α-Vasikka (program for data acquisition)
  - SNITCH (data management)
- Full documentation of all material and program

Module 1: Prologue to the training course

- Scope and content of the training package
- Introduction to non-destructive alpha spectrometry
- Demonstration and computer exercise

Module 2: Sampling

- Air sampling
- Sampling from liquids
- Surface sampling, swipes
- Training with equipment

Module 3: Measurements

- in vacuum
- in ambient air pressure
- Software for data acquisition
- Training with equipment

Module 4: Spectrum analysis

- Principles of spectrum analysis
- Computer exercises on AASIFIT and ADAM programs

Module 5: Data management

- Linssi database
- Remote expert support, SNITCH
- demonstration, computer exercise

Fig. 1. Structure of the modular training package

Modules

Module 1: Prologue to the training course

Scope and content of the training package is introduced in Module 1. Basics and overview of non-destructive alpha spectrometry is also presented. As an example, Module 1 contains the description of the basic phenomena important in the measurements (Fig. 2).
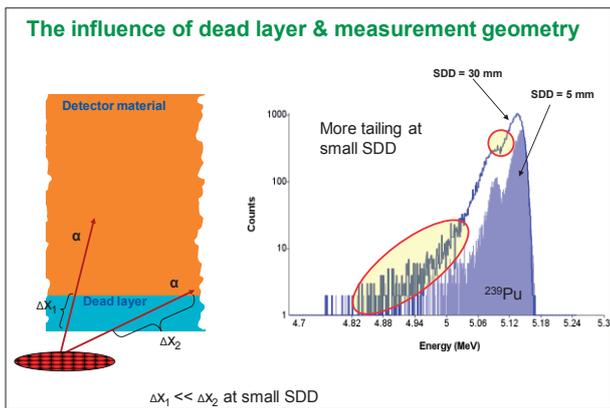

Fig. 2. Influence of the dead layer of the detector and measurement geometry.

Module 2: Sampling in non-destructive α spectrometry

Sampling has a special role in non-destructive alpha spectrometry. New ways of producing appropriate samples, for which no radiochemical sample processing is needed, is presented in Module 2 (Fig.3).
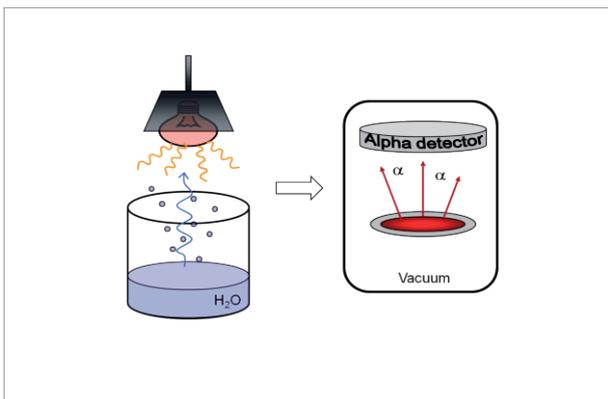

Fig. 3. Processing of liquid samples.

Module 3: Measurements

The samples can be measured in vacuum or in ambient air pressure. Novel means for measurements are presented in Module 3 (Fig. 4).

Fig. 4. Measuring a high-resolution alpha spectrum at ambient air pressure.

Module 4: Spectrum analysis

Software for analyzing even complex alpha spectra are presented, demonstrated and exercised in Module 4 (Fig. 5).
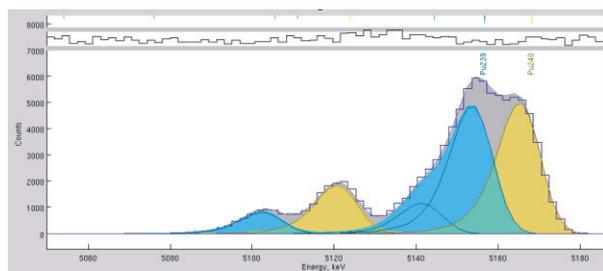

Fig. 5. Unfolding ^{239}Pu - ^{240}Pu multiplet using ADAM.

Module 5: Data management

Efficient data management is of utmost importance e.g. in security applications. In Module 5 a new concept is introduced and demonstrated.

Requests for organizing a course: see contact information beside.