"Training on the use of Synchrotron X-ray Fluorescence imaging and X-ray Absorption Spectroscopy in Plant Science"

Tuesday, 9th – Thursday, 11th April 2024

Grenoble, France

Description

This training will provide theoretical and hands-on training on synchrotron X-ray Fluorescence imaging and X-ray absorption spectroscopy to scientist interested in mapping toxic and nutrient elements in plant samples.

The fundamentals of X-ray fluorescence and X-ray absorption spectroscopy will be covered with lectures. Hands-on training at beamline ID21 will be performed on sample preparation for cryogenic, and samples will be analysed at the beamline (XRF and XANES). Data analysis will be preformed on the acquired data using the software PyMCA, LARCH and ORANGE.

Outcome

The participants of this training will have hands-on experience on analysis of plant samples with Synchrotron X-ray fluorescence imaging and X-ray absorption spectroscopy. This includes sample preparation (cryogenic samples), data acquisition, data analysis and interpretation.

Start: April 9th 9am

End: April 11th 5pm

Duration: 3 days

Location: ESRF in Grenoble, France

Trainers/Speakers: Hiram Castillo, Julie Villanova, Geraldine Sarret.

Trainees: As lab space is limited, we can only accept 8 trainees, therefore in the MC we decided on the following selection procedure:

Within 14 days from my sending of this invitation mail, please send me an e-mail (castillo@esrf.fr) with a short (approx. 200 words) motivation letter.

After 14d, we will evaluate the applications and communicate the decision (7d). In the selection, we will give PhD students priority and select according to the motivation letters. If places are left

over after this procedure, we will offer the remaining places to members of the other WG's, again with the same selection criteria. If the choice between two candidates cannot be decided by the aforementioned criteria because they have too equal rank, the principle "first come first served" applies.

Potential/preferred participants,

Young researchers (PhDs and Postdocs) interested in:

1. Elemental distribution in plants at micro-scale.
2. Elemental speciation in plants at micro-scale.
3. Methods for cryo-preservation of plant samples for imaging.

Training Program

Day 1, 09:00-12:30 Introduction to synchrotron radiation, X-ray fluorescence imaging and X-ray absorption spectroscopy in plant science.

Day 1, 14:00-17:30 X-ray fluorescence data analysis with PyMCA

- XRF fitting of maps
- XRF quantification of maps
- Presentation of XRF maps (RGB color and heat maps)

Day 2, 08:30-12:30:

- Group 1 (4 trainees) Hands-on training at ID21. Cryogenic sample preparation and XRF/XANES analysis on the prepared samples at ID21.

- Group 2 (4 trainees) Explanation of the proposal submission process at ESRF. Draft proposal writing in selected research project as a group.

Day 2, 14:00-18:00:

- Group 1 (4 trainees) Hands-on training at ID21. Cryogenic sample preparation and XRF/XANES analysis on the prepared samples at ID21.

- Group 2 (4 trainees) Explanation of the proposal submission process at ESRF. Draft proposal writing in selected research project as a group.

Day 3, 09:00-12:30 XANES data analysis training (LARCH and ORANGE)

- XANES PCA analysis
- XANES linear combination fitting

- XANES data interpretation

Day 3, 14:00-16:00 Synchrotron techniques in plant science.

- Julie Villanova scientist at ID16B nanoXRF/XANES
- Geraldine Sarret UGA/ISterre Scientist Long term user at ESRF (FAME, ID21, Id16b)

Day 3, 16:00-17:00 Conclusions/ closure of training