

## Abstracts of the morning session talks by the keynote speakers

There is an increasing interest and demand for fast imaging in the Materials Science community, fueled and supported by new scientific and technological developments in each imaging field. These developments are gradually allowing for visualizing the (micro- and nano-)structure of samples while they undergo changes in time due to different physical or chemical processes, with increasingly higher temporal resolutions which differ depending upon the type of radiation used for the image formation.

In this Topical Day, we will learn, from three keynote speakers, about the latest advancements in high temporal resolution imaging with X-ray photons, neutrons and electrons.

**Rajmund Mokso** is beamline scientist in the X-ray Tomography Group at the Swiss Light Source (SLS), Paul Scherrer Institute (PSI), Villigen (Switzerland). He will show what are the limitations in 3D imaging of samples undergoing fast dynamical changes with X-ray Tomographic Microscopy and Nanoscopy and which approaches and implementations, both in terms of instrumentation and image processing, have been adopted and are under development at the TOMCAT beamline of the SLS for overcoming such limitations. He will then show examples from results of fast X-ray tomographic imaging up to a sampling frequency of 20 Hz.

**Anders Kaestner** is beamline scientist in the Neutron Imaging and Activation Group of the Swiss Neutron Spallation Source (SINQ), PSI. He will describe the undergoing developments at PSI for increasing the maximum temporal resolution in imaging by neutrons exploiting new instrumentation and image acquisition/analysis approaches. He will show examples of real-time visualization of dynamic processes in a variety of materials and systems.

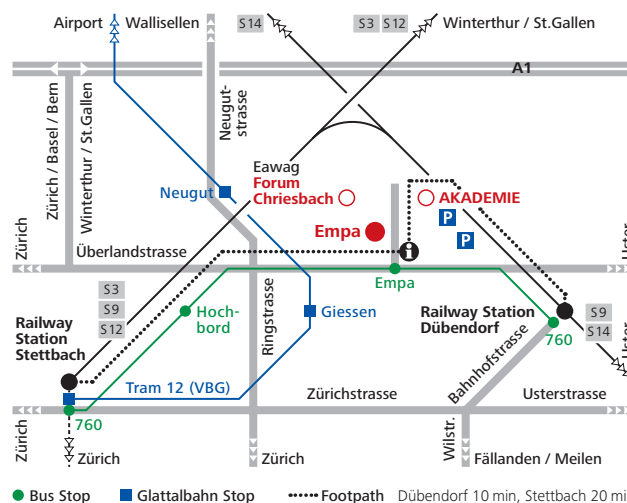
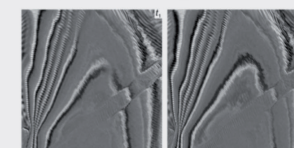
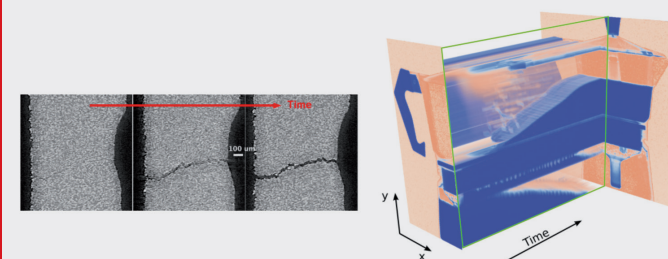
**Yoshie Murooka** is a research scientist in the Laboratory for Ultrafast Microscopy and Electron Scattering at the Swiss Federal Institute of Technology in Lausanne (EPFL). He will show how the temporal resolution of Transmission Electron Microscopy (TEM) can be improved of several orders of magnitude by adopting pulsed electron beams as imaging source and how this improvement allows for investigating dynamic processes at the nano scale.

## GENERAL INFORMATION

Location	Empa, Dübendorf Überlandstrasse 129 AKADEMIE
Costs	The event is sponsored by Empa and is free of charge.
Registration	<a href="http://www.empa.ch/imaging">www.empa.ch/imaging</a>
Deadline	October 19, 2014
Contact	Michele Griffa Phone +41 58 765 43 60 <a href="mailto:michele.griffa@empa.ch">michele.griffa@empa.ch</a> <a href="http://www.empa.ch">www.empa.ch</a>
How to get here	There is only limited parking available; please do use public transport.

## TOPICAL DAY

# Imaging and image analysis VI



Empa, Dübendorf, Überlandstrasse 129  
Friday, October 31, 2014, 8.30am – 5pm

Online registration: [www.empa.ch/imaging](http://www.empa.ch/imaging)

## TOPICS

Imaging, from scanning electron microscopy, scanning probe microscopies, optical microscopy to X-ray/neutron radiography/tomography and more, as well as different methods and techniques used in performing image analysis.

## TARGET AUDIENCE

Scientists, PhD's and post-docs working with different imaging techniques and image analysis procedures.

## OBJECTIVES

The series of Topical Days on Imaging and Image Analysis offers a platform for keeping abreast of the latest developments and for sharing experience in the fields of imaging/image analysis to scientists, both of the ETH domain and of other public/private institutions.

In this edition, the morning session is dedicated to **imaging with high temporal resolution**. Three invited lecturers (Rajmund Mokso, SLS, PSI, Anders Kaestner, NIAG, PSI, and Yoshie Murooka, LUMES, EPFL) will present latest advancements for fast imaging methods exploiting X-rays, neutrons and electrons, respectively. During the afternoon session, after lunch, several Empa scientists will present results from their work, exploiting imaging/image analysis methods.

## PROGRAM

- 08.30 Welcome Coffee/Registration
- 08.50 Opening Remarks  
Michele Griffa, Center for X-ray Analytics and Concrete/Construction Chemistry Laboratory, Empa
- Morning Session.**  
**High temporal resolution imaging with X-rays, neutrons and electrons**
- 09.00 4D X-ray imaging of complex dynamic processes  
Rajmund Mokso, X-ray Tomography Group, Swiss Light Source, Paul Scherrer Institute, Villigen (CH)
- 10.00 Coffee break

- 10.30 Neutrons for real-time monitoring of dynamic processes  
Anders P. Kaestner, Neutron Imaging and Activation Group, Paul Scherrer Institute, Villigen (CH)
- 11.30 Time-resolved transmission electron microscopy using short pulse electron beam  
Yoshie Murooka, Laboratory for Ultrafast Microscopy and Electron Scattering, Institute of Condensed Matter Physics, Swiss Federal Institute of Technology Lausanne (EPFL), Lausanne (CH)
- 12.30 Lunch
- Afternoon session.**  
**Examples of current work at Empa**
- 14.00 Accessing the chemical information in 3D at the nanoscale via in-situ ToF-SIMS/SFM combination  
Laetitia Bernard,  
Laboratory for Nanoscale Materials Science
- 14.30 Use of scanning probe microscopy to correct depth information in 3D SIMS images  
James Whitby, Laboratory for Mechanics of Materials and Nanostructures
- 15.00 Coffee break
- 15.30 Resolution limits of Terahertz Holography  
Peter Zolliker,  
Laboratory for Reliability Science and Technology
- 16.00 Measuring the temporal-spatial distribution of liquids in porous materials by table-top X-ray computed tomography instruments. state-of-the-art and beyond  
Iwan Jerjen, Center for X-ray Analytics
- 16.30 3D experimental investigation of the hygro-mechanical behavior of wood at cellular and sub-cellular scales  
Alessandra Patera,  
Laboratory for Building Science and Technology
- 17.00 Closing

## REGISTRATION

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You will receive a confirmation by e-mail.