# 12. Juli - 16. Juli 2009
# Interdisciplinary Symposium on 3D Microscopy 2009
# Interlaken, Switzerland

## Sunday 12.07.09

**Registration:**
16:00 to 19:00.

**Welcome Apero:**
19:00

# Monday 13.07.09

8:30-9:15 **Plenary Talk:**
The Swiss FEL Project at PSI: Fundamentals, Implementation and Possible Applications
B.Patterson
Chairperson: Sousan Abolhassani

## 3D X-ray Microscopy and Tomography

### Chairperson: Marco Stampanoni

9:15-9:20 Introduction to X-ray Microscopy and Tomography session
Marco Stampanoni

9:20-9:50 Nano-tomography and spectroscopy with a full-field X-ray microscope
Gerd Schneider, Peter Guttmann, Stefan Heim, Stefan Rehbein, Stephan Werner (invited talk)

9:50-10:10 3D chemical mapping by STXM angle scan tomography
Martin Obst, Jian Wang, Adam P. Hitchcock (contributed)

10:10-10:30 3D imaging of cement particles and cement hydration using X-ray nanotomography – pilot investigation
Pavel Trtik, Beat Münch, Pietro Lura, Barbara Lothenbach, Federica Marone, Rajmund Mokso, Marco Stampanoni (contributed)

10:30-10:50 3D Xray tomographic microscopy of calcified tissues in the avian egg shell microarchitecture of the chicken, flamingo, cassowary and emu.
Jaap Boon, Jerre van der Horst, Ester Ferreira, Federica Marone, Marco Stampanoni (contributed)

10:50-11:20 Coffee Break

11:20-11:50 Scanning SAXS: imaging nano-scale structures of extended objects
Oliver Bunk (invited talk)

11:50-12:10 Fast fluorescence tomography with a hard X-ray scanning microprobe
Martin de Jonge, Christian Holzner, Daryl Howard, Stephen Baines, Chris Jacobsen, Stefan Vogt (contributed)

12:10-12:30 3D visualization of the snow microstructure
Martin Heggli, Thiemo Theile, Stephen Steiner, Henning Löwe, Martin Schneebeli (contr.)

12:30-12:50 Combined 3D morphological and chemical imaging using a multi-modal micro-CT/XRF scanner
Peter Bruyndonckx, Alexander Sasov, Xuan Liu (contributed)

13:15-14:45 Lunch

# Monday 13.07.09

## 3D CLSM and Light Microscopy

### Chairperson: Markus Dürrenberger

14:45-15:00 The confocal Technique
Markus Dürrenberger

15:00-15:45 Branching morphogenesis: a closer view using live imaging
Markus Affolter (invited talk)

15:45-16:15 Coffee Break

16:15-16:35 Visualisation and identification of engineered nanoparticles in lung cells: A challenge for advanced microscopic methods
Barbara Rothen, Christina Brandenberger, Dimitri Vanhecke, Andrea Lehmann, Martin Clift, David Raemy, Loretta Mueller, Peter Gehr, Matthias Ochs (contributed)

16:35-16:55 Confocal µ-XRF and µ-XANES and nano-tomographic mapping of radiotracer Np in a fractured granite bore core
Melissa A. Denecke (contributed)

16:55-17:15 Correlative 3D Microscopy: from CLSM to FIB-SEM
Miriam S. Lucas, Maja Guenthert, Stephan Handschin, Philippe Gasser, Roger Wepf (contributed)

17:15-17:35 High resolution spatiotemporal visualisation of blood vessel formation in zebrafish by live confocal and FIB/SEM imaging
Lucy Collinson, Hannah Armer, Giovanni Mariggi, Ken P'Ng, Holger Gerhardt, Andy Bushby (contributed)

# Tuesday 14.07.09

8:30-9:15 **Plenary Talk:**
Travelling-wave MRI
K. Prüssmann
Chairperson: M.Stampanoni

## 3D FIB/SEM serial sectioning

### Chairperson: Marco Cantoni/Lorenz Holzer

9:15-9:45 3D Visualisation of Neuronal Structure Using Focused Ion Beam and Scanning Electron Microscopy
Graham Knott, Marco Cantoni (invited talk)

9:45-10:05 High-throughput 3D Cellular Imaging
Ben Lich, David Wall (contributed)

10:05-10:25 Quantitative characterization of silver-based contact materials by FIB tomography and 3D image analysis
Michael Engstler, Alexandra Velichko, Christian Selzner, Frank Mücklich (contributed)

10:25-10:45 3D-microstructure analysis of solid oxide fuel cell (SOFC) anode
Lorenz Holzer, Beat Muench, Marco Cantoni (contributed)

10:45-11:15 Coffee Break

11:15-11:45 3D Energy-Dispersive X-ray Spectrometry in a Dual-Beam FIB (3D-FIB EDXS)
M. Schaffer, J. Wagner, W. Grogger (invited talk)

11:45-12:05 Advances in 3D Microscopy and Micro-Analysis using DualBeam Technology
Francis Morrissey, Ellen Baken, Steve Reyntjens, Laurent Roussel (contributed)

12:05-12:25 Three-dimensional tomographic EBSD measurements of the crystal topology in heavily deformed ultra fine grained Cu-0.17wt%Zr obtained from ECAP and HPT
Anahita Khorashadizadeh, Myrjam Winning, Stefan Zaefferer, Dierk Raabe (contributed)

12:25-12:45 3D-EBSD Investigation on Orientation Gradients and Geometrically Necessary Dislocations Induced by the Martensitic Phase Transformation in Ultrafine Grained Dual-Phase Steels
Marion Calcagnotto, Dirk Ponge, Eralp Demir, Dierk Raabe, Stefan Zaefferer (contributed)

12:45-16:15 Lunch

# Tuesday 14.07.09

## Stereology

### Chairperson: Matthias Ochs

16:15-17:00 Introduction: basic concepts of stereology
Matthias Ochs

17:00-17:45 Stereological methods for estimating geometrical characteristics of biological structures using virtual test probes applied to 3D images
Lucie Kubinova, Jiri Janacek (invited talk)

17:45-18:15 Coffee Break

18:15-18:45 A combination of serial sectioning, electron tomography and stereology provides new insights in the secretion of surfactant from human alveolar epithelial type II cells
Dimitri Vanhecke, Christian Manuel Widmer, Beat Haenni, Thorsten Wahlers, Jens Randall Nyengaard, Hans-jorgen Gundersen, Matthias Ochs (contributed)

18:45-19:00 A stereological analysis of cellular internalization and trafficking of gold nanoparticles
Christina Brandenberger, Barbara Rothen-Rutishauser, Matthias Ochs, Anke-Gabriele Lenz, Otmar Schmid, Peter Gehr, Christian Mühlfeld (contributed)

19:00-19:15 Therapeutic Application of Immunoliposomes in Experimental Mesangial Proliferative Glomerulonephritis
Angela Suana, Gérald Tuffin, Brigitte M. Frey, Hans-Peter Marti (contributed)

19:30-22:00 Apero

19:30-22:00 Poster Session

# Wednesday 15.07.09

8:30-9:15 **Plenary Talk:**
Scanning Force Microscopy on Mars
U. Staufer, T. Pike, W. Goetz, H. Sykulska , S. Vijendran, D. Parrat, E. Hemmig, M. Hecht and the Phoenix Science Team
Chairperson: Sousan Abolhassani

## Other methodes
### Chairperson: Sousan Abolhassani

9:20-9:40 The non-destructive Dimensional SEM/FIB
Volker Klocke, Burckhard Plitzko (contributed)

## Scanning Probe Microscopies
### Chairperson: Urs Staufer

9:45-10:15 The Critical Dimension Metrology perspectives and future trends in the semiconductor industry
Johann Foucher (invited talk)

10:15-10:35 Coffee Break

10:35-10:55 Three-Dimensional Force Imaging and Quantification with Atomic Resolution
N. Pilet, B. J. Albers, T. C. Schwendemann, M. Z. Baykara, E. I. Altman, U. D. Schwarz (contributed)

10:55-11:15 3D NanoChemiscope: a new tool for future nanoscience ?
Laetitia Bernard, Sasa Vranjkovic, David Haener, Sven Kayser, Ewald Niehuis and Hans J. Hug (contributed)

11:15-11:35 Nano-Imaging: From Science to Technology
Meike Stoehr, Thomas Jung (contributed)

11:45-13:45 Lunch and Hands-on Workshop on 3D image analysis
Open Source and Commercial 3D Imaging Software packages
demonstration and ready to go installation onto your Labtop
Organizer: Roger Wepf
(individual training possible till 17:00)

# Wednesday 15.07.09

## High resolution TEM and AFM

### Chairperson: Sousan Abolhassani

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| 14:00-14:45 | Outline of an abstruction-free phase plate for a large range of spatial |
| | frequencies |
| | H.Rose (invited talk) |
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| 14:45-15:20 | High-resolution transmission electron and atomic force microscopy: two |
| | complementary techniques for membrane protein structure determination |
| | D. Fotiadis (invited talk) |
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| 15:20-15:40 | Coffee Break |
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| 15:40-16:20 | Towards atomic resolution in three dimensions with aberration corrected |
| | scanning transmission electron microscopy |
| | A.Beloch (invited talk) |
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| 16:20-16:40 | Atomic scale structural and elemental analysis with Cs-corrected STEM |
| | Tetsuo. Oikawa, S. Falch, M. Rodewald and E. Okunishi (contributed) |
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| 16:40-17:00 | High Resolution TEM study of the initial stages of growth of $MoS_x$ thin films |
| | deposited by magnetron sputtering |
| | Vladislav Spassov, Massoud Dadras and Peter Oelhafen (contributed) |
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| 18:00 | Departure from Kasino Kursaal for FEI Event |

# Thursday 16.07.09

## 3D TEM tomography/serial sectioning

### Chairperson: Roger Wepf

8:35-9:15 Cryo Electron Tomography in Life Science (working Title)
J.M. Plitzko (invited talk)

9:15-9:30 Molecular architecture of inner dynein arms of Chlamydomonas in vivo by cryo-electron tomography
Khanh Huy Bui, Hitoshi Sakakibara, Tandis Movassagh, Kazuhiro Oiwa, Takashi Ishikawa (contributed)

9:30-10:00 Dissecting unusual Archaea, and reassembling in 3, from serial sections by electron microscopy
R.Rachel (contributed)

10:00-10:15 Towards reconstruction of neuronal circuits in the zebrafish brain by serial block face scanning EM
Patrick Schwarb, Rainer Friedrich, Graham Knott, Christel Genoud (contributed)

10:15-10:30 Fully Automatic Distortion Correction of TEM Images
Verena Kaynig, Bernd Fischer, Elisabeth Müller Gubler, Joachim M. Buhmann (contributed)

10:30-11:00 Coffee Break

## Correlative Microscopy

### Chairperson: Roger Wepf

11:05-11:20 3D Imaging of Polymer Electrolyte Fuel Cell Electrodes by High-Resolution X-Ray Tomography and FIB/SEM Serial Sectioning
H. Schulenburg, B. Schwanitz, J. Krbanjevic, M. Stampanoni, A. Wokaun, G.G. Scherer (contributed)

11:20-11:35 A comparative study using TEM, EPMA and SIMS to examine the composition of oxides on irradiated zirconium alloys
S. Abolhassani, R. Restani, S. Portier, M. Martin (contributed)

11:35-12:05 Analyzing Planar Microstructures in 3-D via Atom Probe Tomography
Stephan Gerstl, Peter Clifton (contributed)

12:15-13:30 Lunch

# Thursday 16.07.09

## 3D Image Analysis and simulation

### Chairperson: Christel Genoud

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| 13:30-14:15 | Automated proteome-wide determination and modeling of subcellular location for systems biology<br>Robert F. Murphy (invited talk) |
| 14:15.14:40 | Three-Dimensional Reconstruction of Biological Macromolecular Complexes from In-lens Scanning Electron Micrographs<br>Jeremy David Woodward, Roger Wepf, Brian Trevor Sewell (contributed) |
| 14:40-15:00 | Analysis of the topological evolution of an evolving pore network using 3D tomography<br>P. Levitz, V. Tariel, E. Gallucci, M. Stampanoni (contributed) |
| 15:00-15:30 | Coffee Break |
| 15:30-16:15 | Markers for Correlative Fluorescence Serial Block-Face Scanning Electron Microscopy: Obtaining True Boundaries for Contouring and Segmenting Neurons<br>Eduardo Rosa-Molinar (contributed) |
| 16:15-16:40 | Tools for large-scale microscopy image processing and analysis<br>Aaron Ponti (contributed) |
| 16:40-17:00 | Quantitative 3D analysis of the intermediate filament network using SEM-tomography<br>Sebastian Lück, Michaela Sailer, Volker Schmidt, Michael Beil, Guido Adler, Paul Walther (contributed) |
| 17:00 | End of Symposium |