E·U·S·M·A·T

2012 DocMASE Summer School

3D Characterization of Materials

From micro to atomic scale

Aug. 27 – Sept. 1 2012

Saarbrücken

EUSMAT – European School of Materials

Department of Materials Science and Engineering of Saarland University

Theme and Goals

The 2012 DocMASE Summer School will focus on the 3D characterization of micro- and nanostructures in the field of materials science. Theoretical concepts of 2D and 3D characterization as well as several tomographic techniques will be presented. These include SEM/FIB Tomography, X-Ray Computer Tomography, Synchrotron Tomography, TEM Tomography and Atom Probe Tomography. Through a series of presentations and practical demonstrations, participants will become familiarized with the development, working principles, current capabilities and applications of the different techniques presented. These seminars will be well-complemented by a visit of our facilities and those of our nearby partners. Additionally, DocMASE candidates will have the chance to present their own research to the other participants as well as to students of the AMASE Master Programme who could be interested in joining DocMASE in the future. Some social and leisure activities will help to further promote knowledge exchange and networking. The intercultural nature of EUSMAT's higher learning programmes will also be respected and fostered. This will result in an enriching experience from which the participants will obtain valuable tools for their future research activities, while expanding their professional network.

The event is aimed at doctoral candidates of the DocMASE programme and of its consortium partners and will be chaired by Prof. Dr. Frank Mücklich, Head of the Chair of Functional Materials at UdS, CEO of Material Engineering Center Saar (MECS) and Chairman of the European School of Materials (EUSMAT).

Speakers:

- Prof. F. Mücklich, Dr. F. Soldera, M. Engstler, H. Aboulfadl, (Functional Materials, Saarland University and MECS),
- Prof. Dr. N. De Jonge (Innovative Electron Microscopy, Leibnitz Institute for New Materials),
- Dr. M. Maisl (Fraunhofer Institute for Non-Destructive Testing)
- Dr. A. Rack (X-ray Imaging Group, European Synchrotron Radiation Facility),
- Dr. R. de Kloe (EDAX BV, Ametek® Materials Analysis Division),
- Dr. K. Schladitz (Fraunhofer Institute for Industrial Mathematics).

Organization: Dr. F. Soldera, F. Miguel, P. Souza (EUSMAT)

DocMASE	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00
Su 26.08	Arrival and accommodation in Saarbrücken													
Mo 27.08	Welcome			Lunch		General introduction to Intercultural Training				Pizza Night		Billiards, latin music at Havanna Club		
Tu 28.08	Summer School Block A			Lunch		Summer School Block B								
We 29.08	Summer School Block C			Lunch		Summer School Block D								
Th 30.08	Summer School Block E			Lunch		Lab visit - INM	EUSMAT Alumni Association Meeting			Barbecue at UdS Campus				
Fr 31.08	DocMASE Student Presentations			Lunch		DocMASE Student Presentations						Dinner at Stiefel Bräu restaurant		
Sa 01.09	Excursion to Völklinger Hütte													
Su 02.09	Departure from Saarbrücken													

Seminar Contents

Tuesday 28.08.2012

9.00-13.00 Block A

- **F. Mücklich** – **Stereography for 2D and 3D microstructural analysis**: basics of quantitative microstructure analysis, grain form parameters, description of complex and inhomogeneous microstructures
- Coffee break
- **F. Soldera** – **SEM/FIB tomography**: FIB technique, principles of FIB tomography, automatic imaging, reconstruction, practical examples

14.00-18.00 Block B

- **R. de Kloe** - **EBSD/EDS/FIB tomography**
- Coffee break
- **N. De Jonge** – **TEM tomography**: introduction into the basics of transmission electron microscopy (TEM) and scanning TEM, element analysis (EELS, EDX), 3D techniques, *in-situ* TEM and STEM

Wednesday 29.08.2012

9.00-13.00 Block C

- **M. Maisl** – **3D analysis with X-ray computer tomography**: principles of CT, geometrical and contrast resolution, CT systems, applications
- Coffee break
- **A. Rack** – **Synchrotron tomography**

14.00-18.00 Block D

- H. Aboulfadl, M. Engstler – **Atom probe tomography (APT)**: history, principles and applications, FIB-SEM assisted sample preparation
- Coffee break
- **H. Aboulfadl**, **M. Engstler** – **APT:** measurements demonstration, introduction to reconstruction and analysis software

Thursday 30.08.2012

9.00-13.00 Block E

- **M. Engstler** – **Serial sectioning tomography:** reconstruction and analysis
- Coffee break
- **K. Schladitz** – **Quantitative 3D analysis of microstructures**

Practical Information

Participation is limited to 20 people.

The participation fee(*) is 300 € and includes:

- Accommodation at the Saarbrücken Youth Hostel (DJH) just 5 minutes by bus from the university campus
- Lunches during the week and dinners organized by EUSMAT
- Visit to the UNESCO World Heritage Site Völklinger Hütte

(*) The participation fee and the travel expenses are covered for DocMASE doctoral candidates.

For more information **contact:**

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Registration procedure

Please fill out the registration form which can be found at www.docmase.net and send a scanned copy to info@eusmat.net.

You will receive an email to confirm if a spot is available for you in our summer school. All accepted participants will then receive details on the payment of the fee, the arrival procedure, etc.

Registration deadline: June 30, 2012

The 2012 DocMASE Summer School will take place in Building D3.3 on the Saarland University campus.