

**August, 25 and 26, 2016**  
Lyon-Tech campus, INSA-Lyon

# WORKSHOP

## ON ENVIRONMENTAL ELECTRON MICROSCOPIES

Environmental scanning and transmission electronic microscopies (ESEM, ETEM) allow the characterization of non-conductive samples, as well as vacuum-sensitive or polluting objects. ESEM and ETEM differ from conventional SEM or TEM since the sample is not put under high vacuum conditions but in a gaseous environment. Moreover, in situ dynamic phenomena can be followed on a wide range of materials (metals, ceramics, polymers, hydrated or biological samples,...). One can indeed study microstructural changes under gaseous or liquid environment, or even during mechanical tests, high temperature treatments, and chemical reactions.

The workshop will include lectures giving the theoretical background, the main advantages and challenges of environmental electron microscopies. Demonstrations will be made on several microscopes or sample holders, to illustrate some experimental key steps.

### DEMOS

Demonstrations will be run on the following topics:

- Multi-modal imaging in ESEM
- In situ studies in ESEM
- Imaging suspensions using a liquid cell in TEM
- Environmental TEM

Registration fees  
150€ / person

### CONTACTS

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More information at [www.emc2016.fr](http://www.emc2016.fr)  
Online registration via [www.sfm.fr](http://www.sfm.fr)

### Thursday, August 25, 2016

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|---------------------|---|
| 8:30 am - 8:45 am   | Welcome   |
| 8:45 am - 9:15 am   | General introduction, practical aspects<br><i>(S. Descartes, K. Masenelli-Varlot, INSA-Lyon, France)</i>                                |
| 9:15 am - 10:45 am  | Principles and Practice of Variable Pressure/<br>Environmental SEM <i>(D. Stokes, FEI company, Netherlands)</i>                         |
| 10:45 am - 11:00 am | Coffee break  |
| 11:00 am - 12:30    | Environmental TEM for Materials Research<br><i>(T. Hansen, Center for Electron Nanoscopy, Technical University of Denmark, Denmark)</i> |
| 12:30 - 2:00 pm     | Lunch   |
| 2:00 pm - 3:30 pm   | Demonstrations on microscopes   |
| 3:30 pm - 4:00 pm   | Coffee break  |
| 4:00 pm - 5:30 pm   | Demonstrations on microscopes   |

### Friday, August 26, 2016

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|---------------------|--|
| 8:30 am - 9:15 am   | Applications of High Temperature experiments in ESEM <i>(R. Podor, Institut de Chimie Séparative de Marcoule, France)</i>  |
| 9:15 am - 10:00 am  | Small scale mechanical tests performed under severe conditions in electron microscopes<br><i>(P. Steyer, Materials Engineering and Science, INSA-Lyon, France)</i> |
| 10:00 am - 10:30 am | Coffee break   |
| 10:30 am - 11:15 am | In-situ analysis of solid-gas interactions using a MEMS-based sample carrier for TEM<br><i>(Hugo Perez Garza, DENS Solutions, Netherlands)</i>                     |
| 11:00 am - 12:30    | Scanning transmission electron microscopy of whole cells and nanomaterials in liquid<br><i>(N. de Jonge, INM-Leibnitz Institute for New Materials, Germany)</i>    |
| 12:30 - 2:00 pm     | Lunch  |
| 2:00 pm - 3:30 pm   | Demonstrations on microscopes  |
| 3:30 pm - 4:00 pm   | Coffee break   |
| 4:00 pm - 5:30 pm   | Demonstrations on microscopes  |