

GROUPE   
**ESB** Higher Education – Research  
Wood Science & Technology

# Summer School on Environmental Scanning Electron Microscopy and Microanalysis

**21st - 23rd June 2016**

At ESB, École Supérieure du Bois  
Nantes - France

In collaboration with



# Introduction

This summer school will provide 6 participants with the opportunity to obtain first-hand experience of using a state-of-the-art Environmental Scanning Electron Microscope – a Quanta 250 made by FEI.

Each of the participants will be encouraged to bring along samples that they wish to analyse. They will then learn by analysing their own specimens and when they leave they will be able to take the images and analyses away with them.

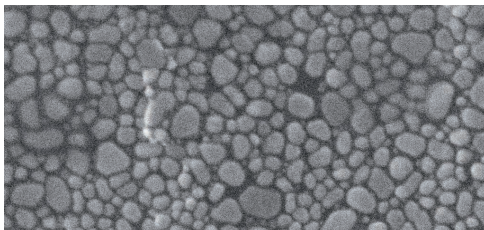
## What types of analyses are possible?

### Imagery

The Quanta 250 can obtain images of samples in 4 different modes:

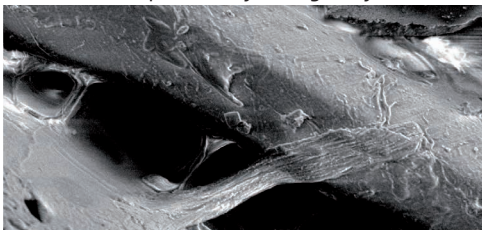
#### Mode 1: Hi Vac

Standard SEM operation for conductive specimens (metals) or organic specimens that have been previously coated with gold or carbon.



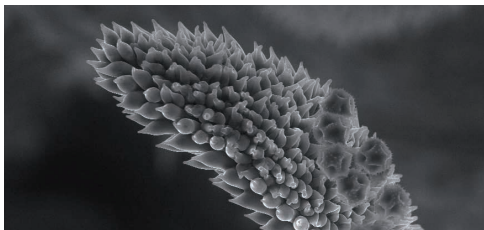
#### Mode 2: Lo Vac

For non-conductive, “dry” specimens like wood. No surface coating need be applied to the specimens. In other words they can be viewed as they are. The maximum chamber pressure 130 Pa (0.075 Torr) and so the samples will dry during analysis.



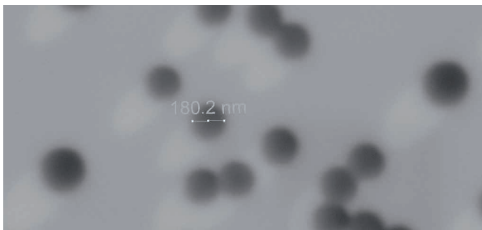
#### Mode 3: ESEM

For “wet” specimens like live plant material. Again no surface coating or specimen preparation required. The maximum chamber is pressure up to 4000 Pa (30 Torr) and so if the sample is cooled with the built-in Peltier stage during analysis it should be possible to avoid drying.



#### Mode 4: Wet STEM

Designed to analyse particles suspended in liquids. Successful images require the creation of very thin films and this takes practice. Sample dehydration is controlled via the temperature of the Peltier stage and chamber pressure.

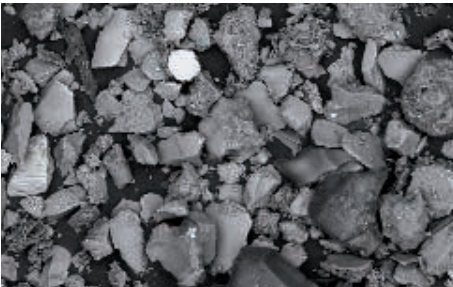


## Surface chemical analyses

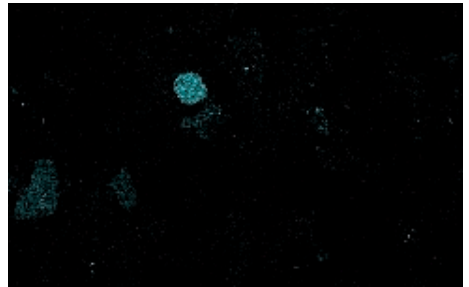
An ESEM obtains images through the impact of electrons hitting the surface of the specimen. The action of these electrons generates X-rays which are characteristic of the elements present on the surface.

Consequently, EDX (Energy Dispersive X-rays) spectroscopy can identify, and to some extent quantify, the elements present. The EDX system fitted to the Quanta 250 can detect elements as light as boron.

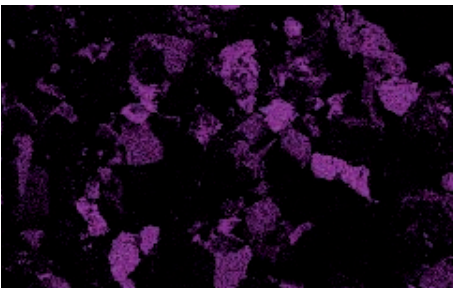
Low vac mode image



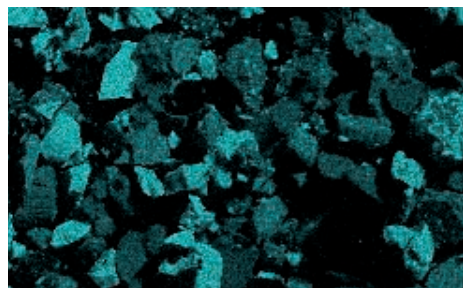
The distribution of Fe



The distribution of Al



The distribution of Si



## Mechanical tests

It is also possible to conduct mechanical tests inside the Quanta 250 using a micro-UTM (universal testing machine).

The UTM has two load cells: one with a maximum load of 2 N and the other at 200 N. So fibre or film testing is possible whilst obtaining images of the test piece.

# Practical Information

The course will be given in English.

The cost of the course is €900/person. If your institute is a member of InnovaWood and it has bought InnovaWood's Special Services Package then the cost is €750/person.

An official order or a €100 non-refundable deposit must be received to guarantee your place.

The course fee will include lunches and coffee, but, not evening meals nor your travel and accommodation costs.

The number of participants is limited to 6, so direct tuition and several hours of "hands-on" the microscope are assured.

<b>Tuesday 21st June</b>	- Introduction to operating ESEM (morning) - Analysis of specimens of participant 1 (afternoon)
<b>Wednesday 22nd June</b>	- Analysis of specimens of participants 2&3 (morning) - Analysis of specimens of participants 4&5 (afternoon)
<b>Thursday 23rd June</b>	- Analysis of specimens of participants 6 (morning) - Course summary, review and prize giving for best image (afternoon)

## Contact Details

To reserve a place or obtain additional information please contact Dr. Mark Irlle.

[mark.irlle@ecoledubois.fr](mailto:mark.irlle@ecoledubois.fr)



**ÉCOLE SUPÉRIEURE DU BOIS**

Atlanpôle – BP 10605

Rue Christian Pauc

F – 44306 Nantes Cedex 3

T. +33 (0)2 40 18 12 12

F.+33 (0)2 40 18 12 00

[www.ecoledubois.fr](http://www.ecoledubois.fr)