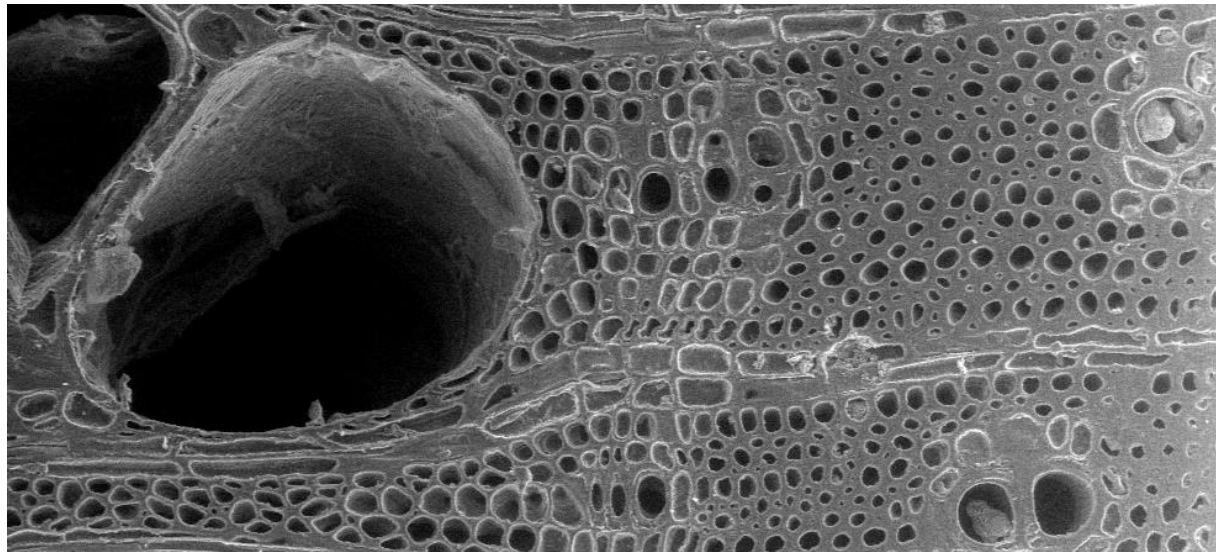




GN-MEBA
Dr. Mark Irle
Research Director
**Ecole Supérieure du
Bois,**
NANTES

Voyage au centre du bois



Ecole Supérieure du Bois

- Fondée en 1934 à Paris
- Installée depuis 1993 à Nantes
 - la deuxième plus forte concentration nationale d'industries de première et seconde transformation du matériau bois





Recherche & développement à l'ESB



Matériaux et
composites
bois



Habitat et
construction



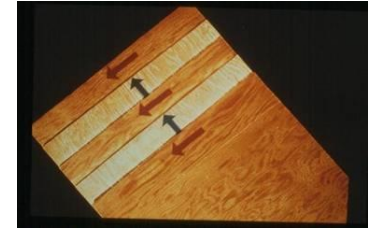
Sciences de
l'éducation

L'équipe Matériaux et Composites Bois

- Le travail scientifique mené par l'équipe est focalisé sur la question :
Comment améliorer les performances et la régularité des matériaux ligno-cellulosiques par la compréhension des interactions entre leurs différents constituants et leur environnement proche?

Materials that interest LMCB

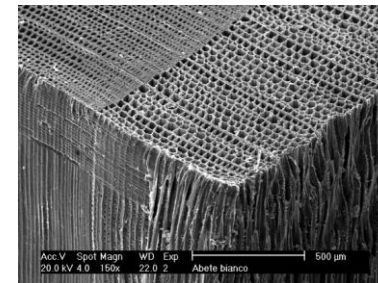
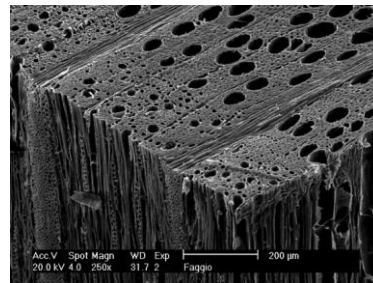
- Wood composites
 - panel products
 - particleboard, OSB, plywood, MDF, etc
 - structural composites
 - glulam, LVL, etc
 - plastic-wood composites
 - wood fuel pellets
- Solid wood
 - weathering



The difference between a light microscope and an ESEM



Anatomy: the wood inside the tree



Anisotropy/Orthotropy

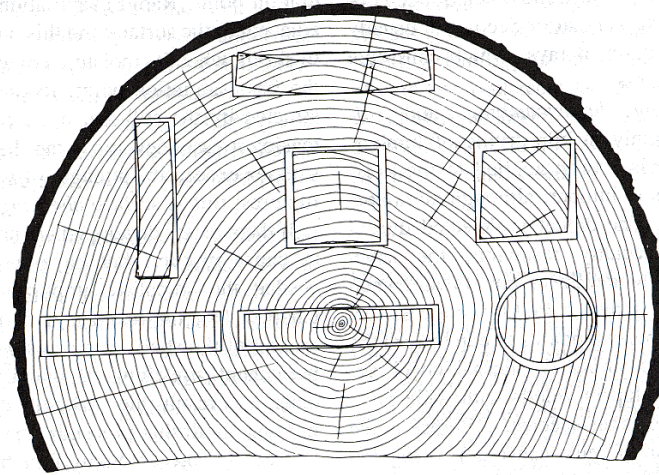


Figure 10-7. Change of shape of various cross-sections and warping due to differential radial and tangential shrinkage. (Courtesy of U.S. Forest Products Laboratory.)

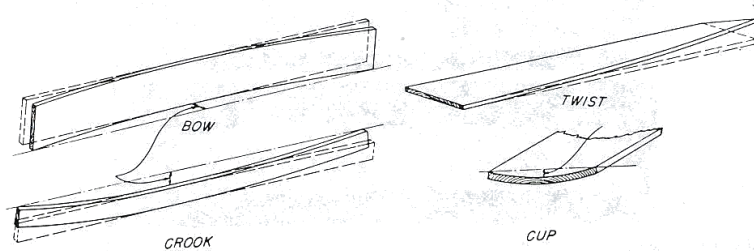
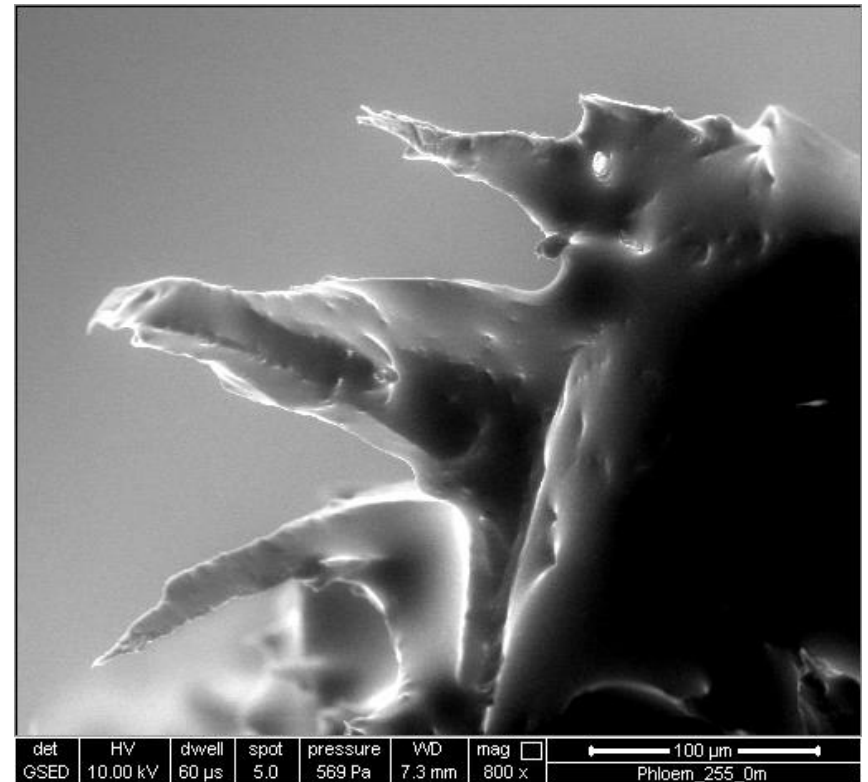
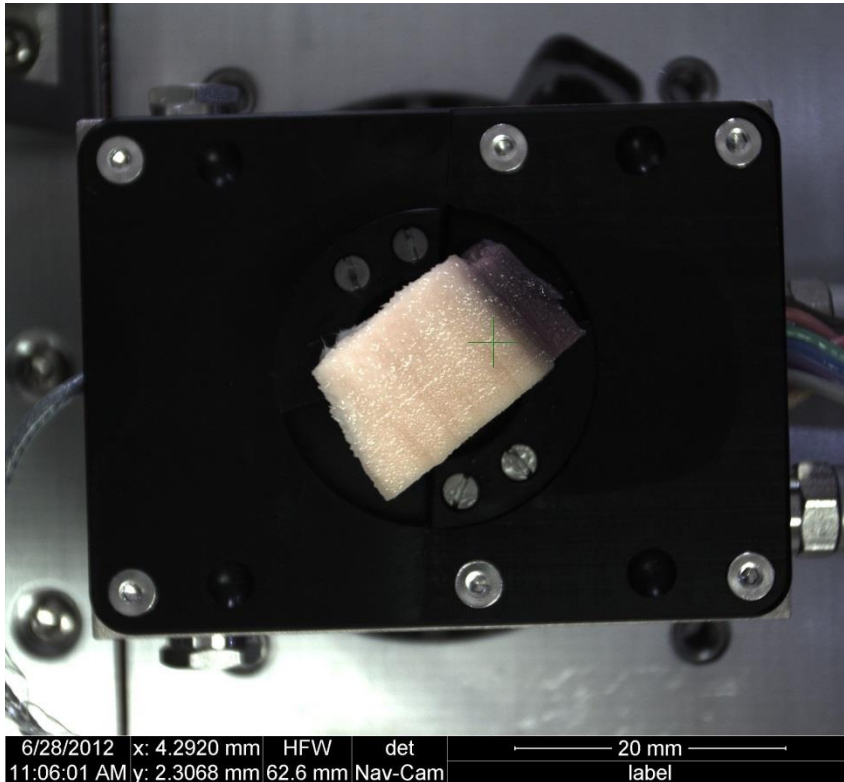


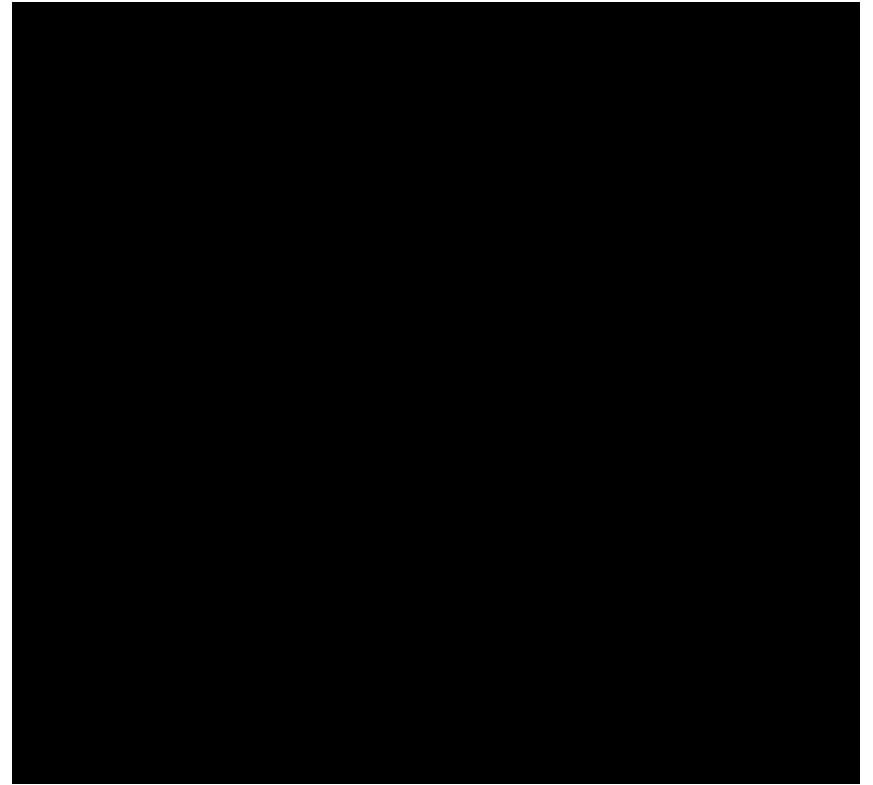
Figure 10-8. Types of warping. (Courtesy of U.S. Forest Products Laboratory.)

Never dried wood

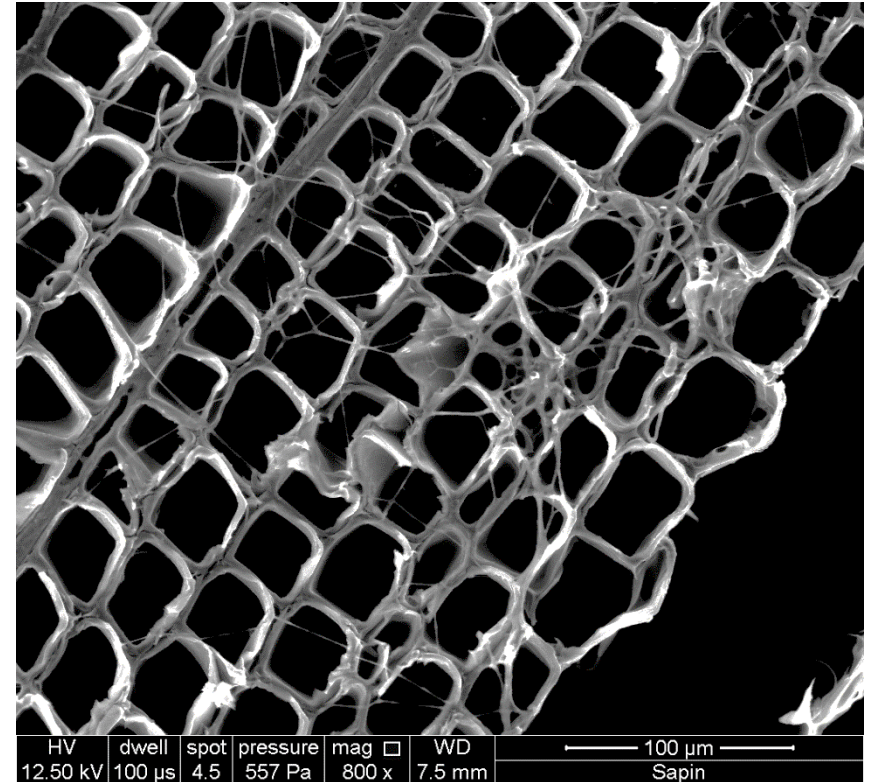
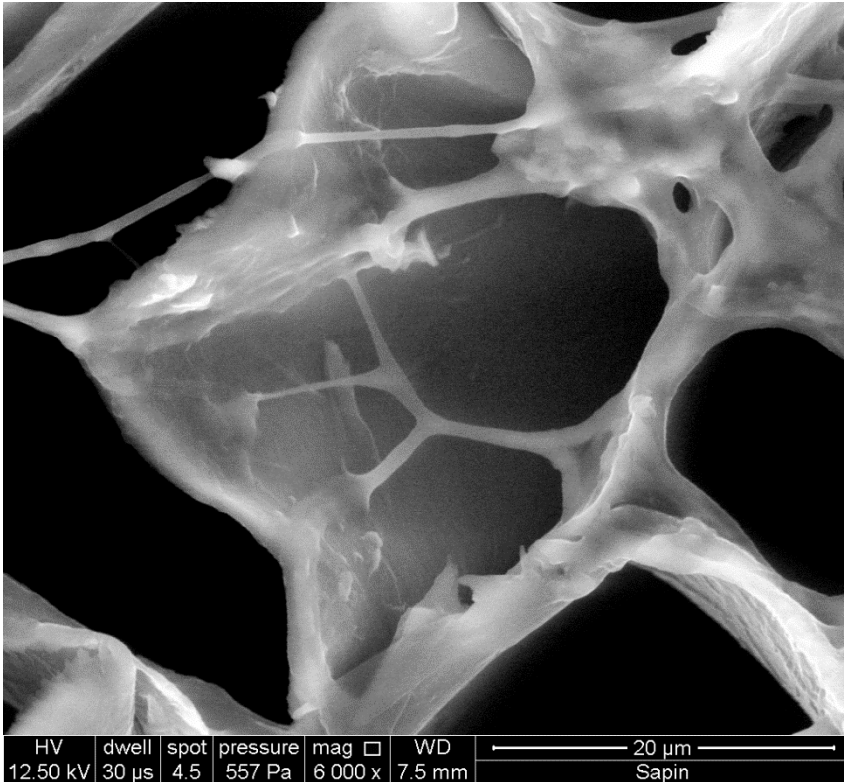




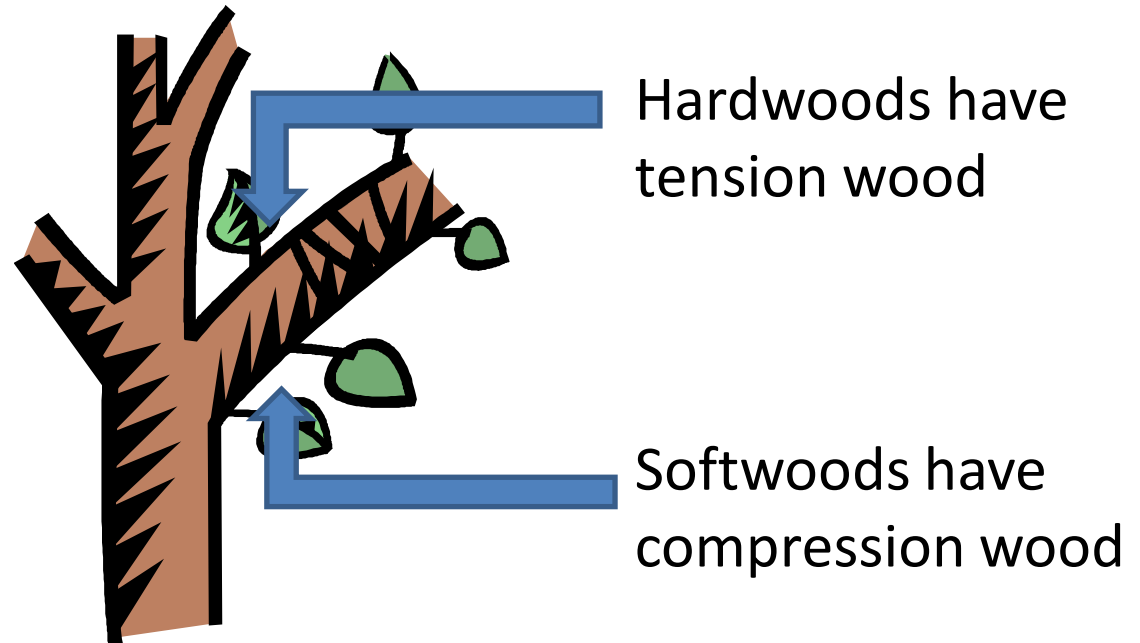
Controlling water content



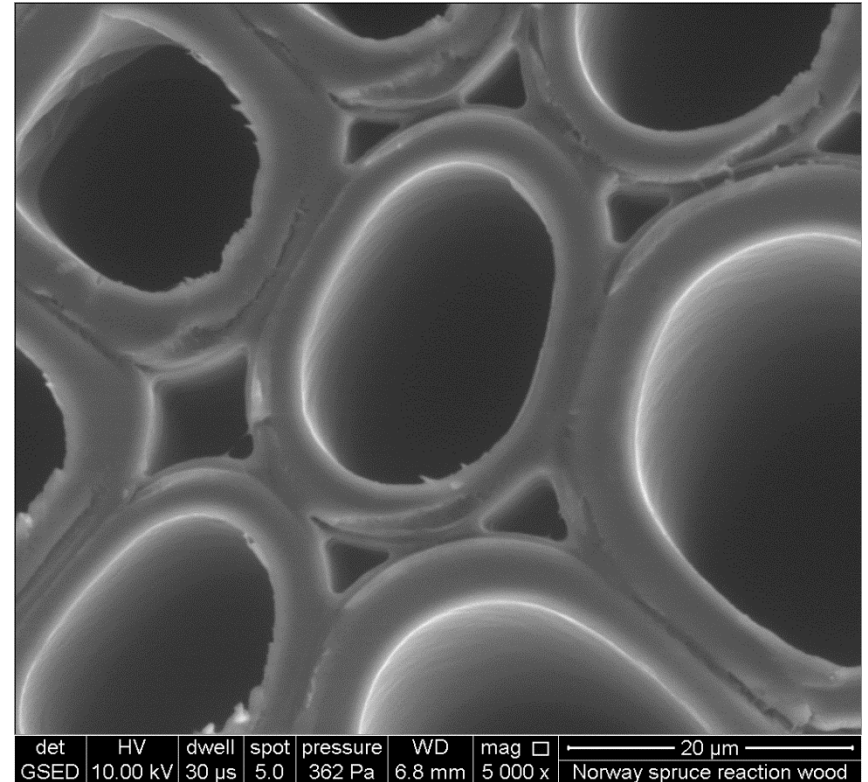
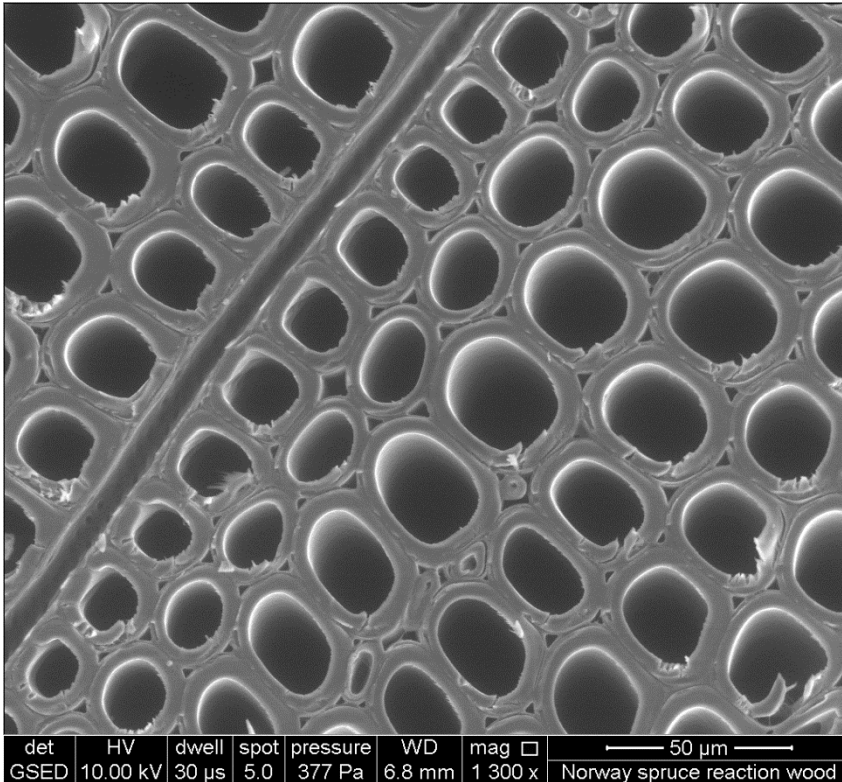
Fungal attack



A tree



Never dried wood: compression wood (*Picea sitkensis*)



Another tree

Bark

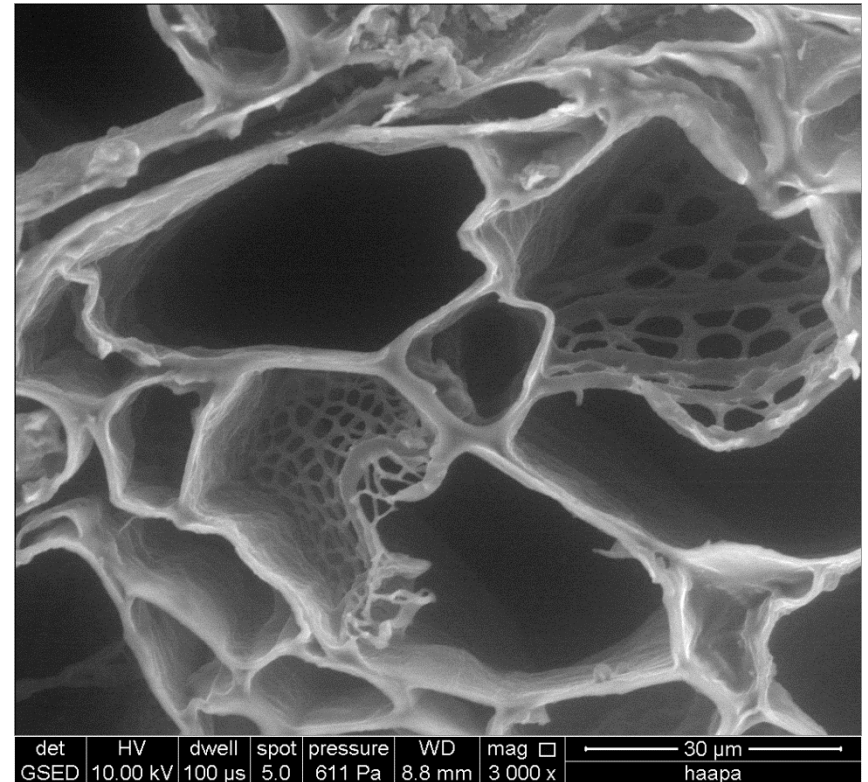
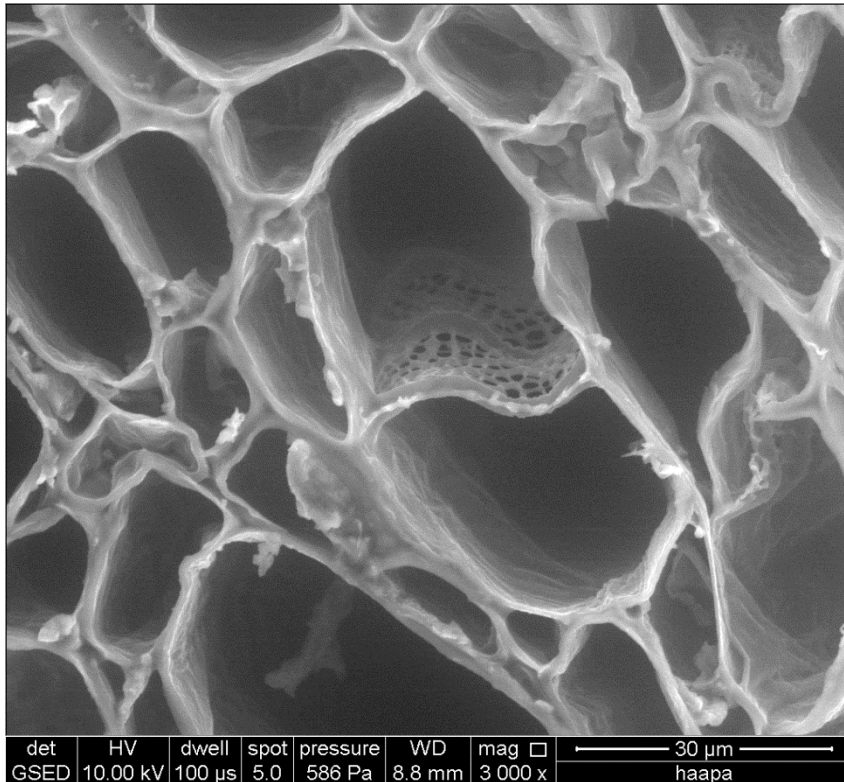
Inner bark

Heartwood

Sapwood



Never dried wood: Phloem

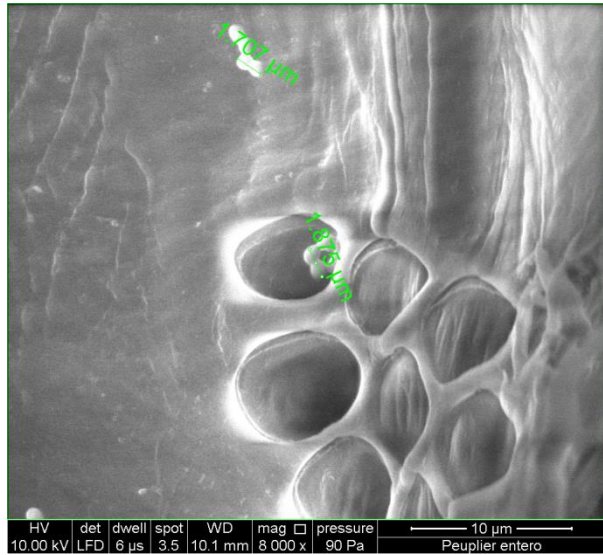
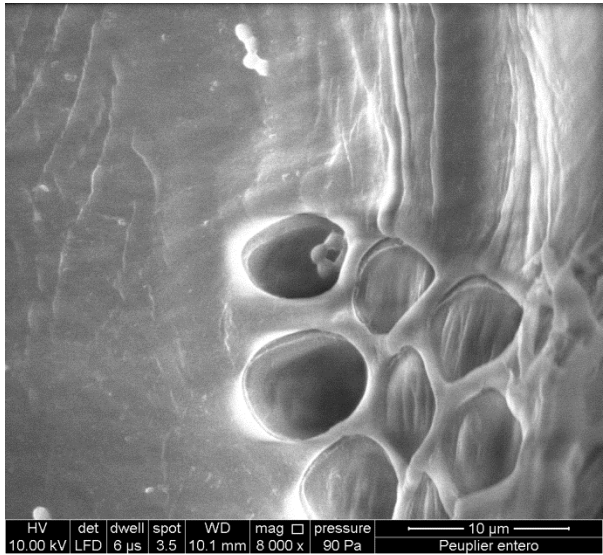
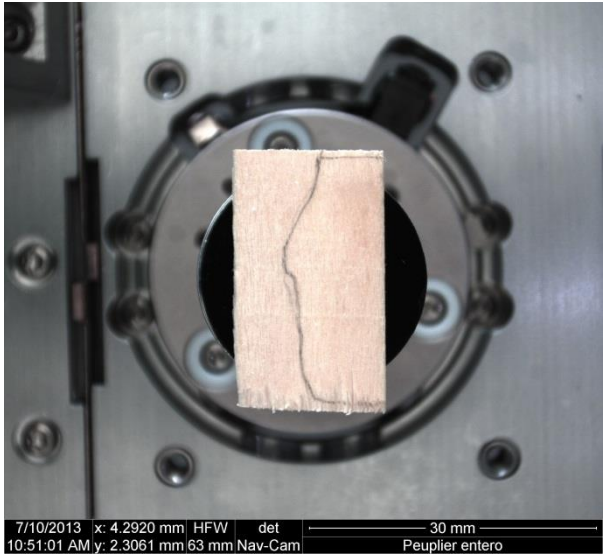




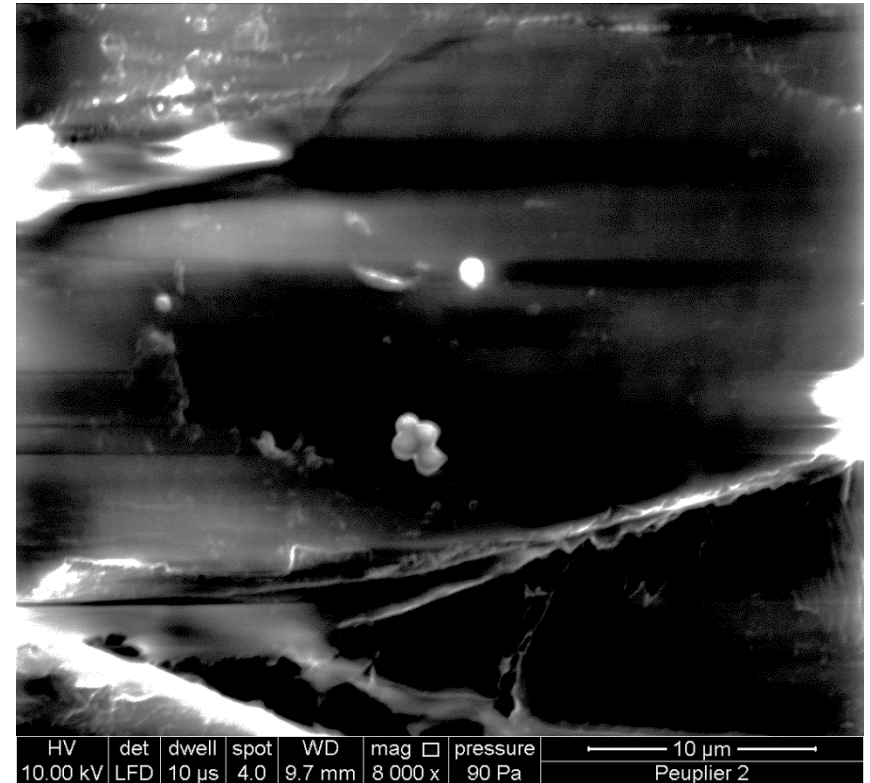
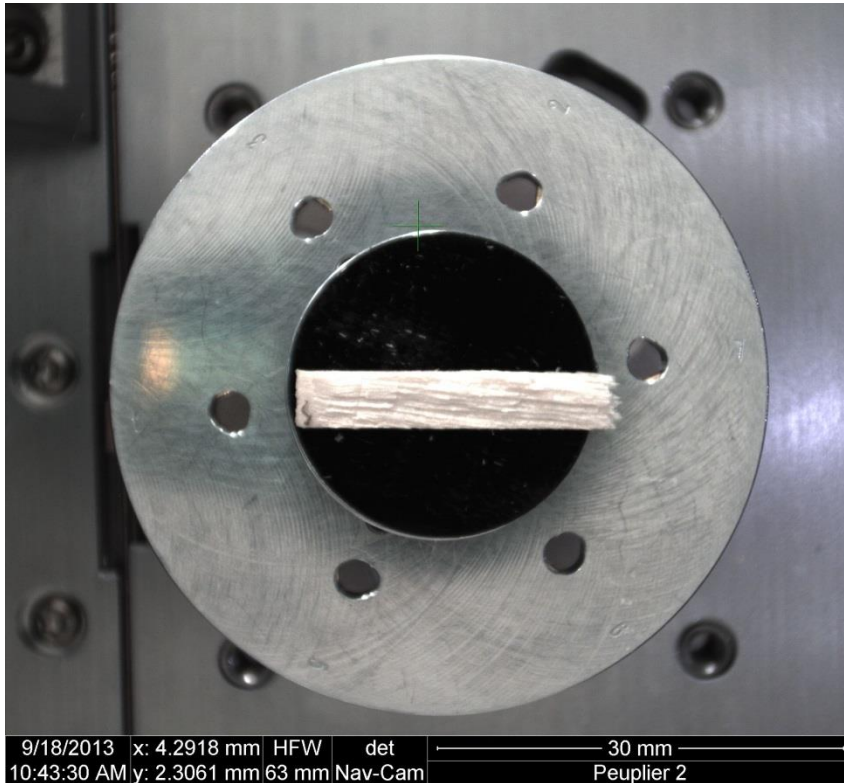
FEI Quanta 250

- Imagined that we would use it primarily in ESEM mode
- However most of the time in lovac (70-90 Pa)

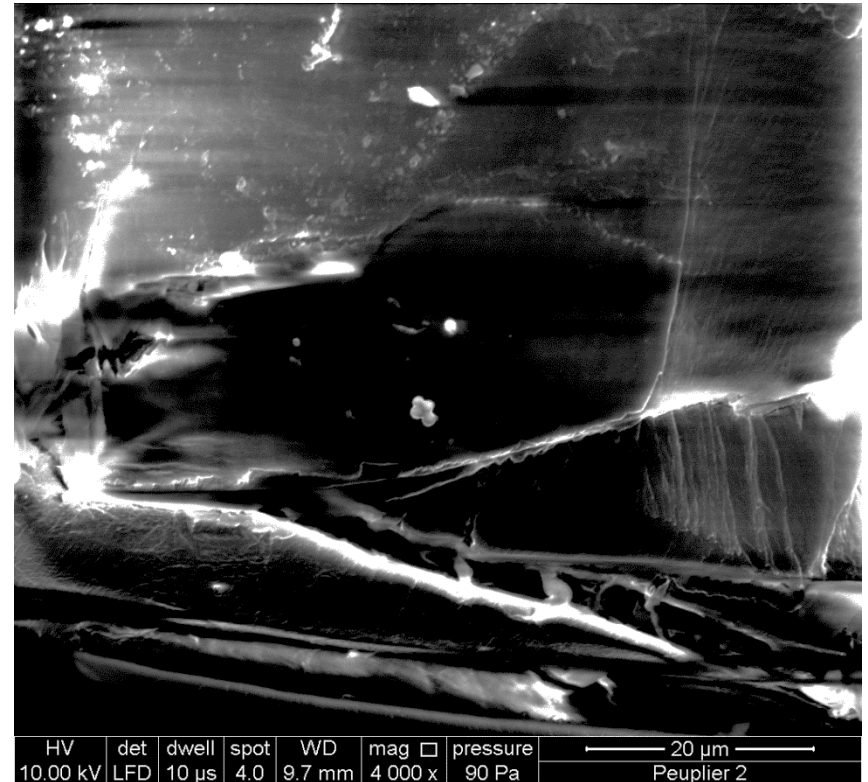
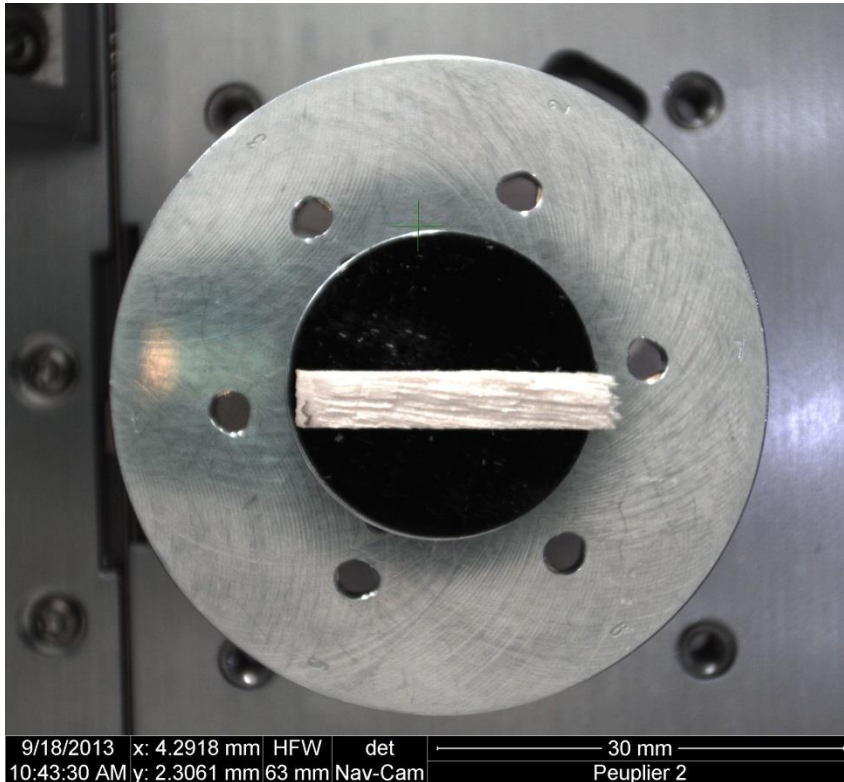
Bacteria on wood



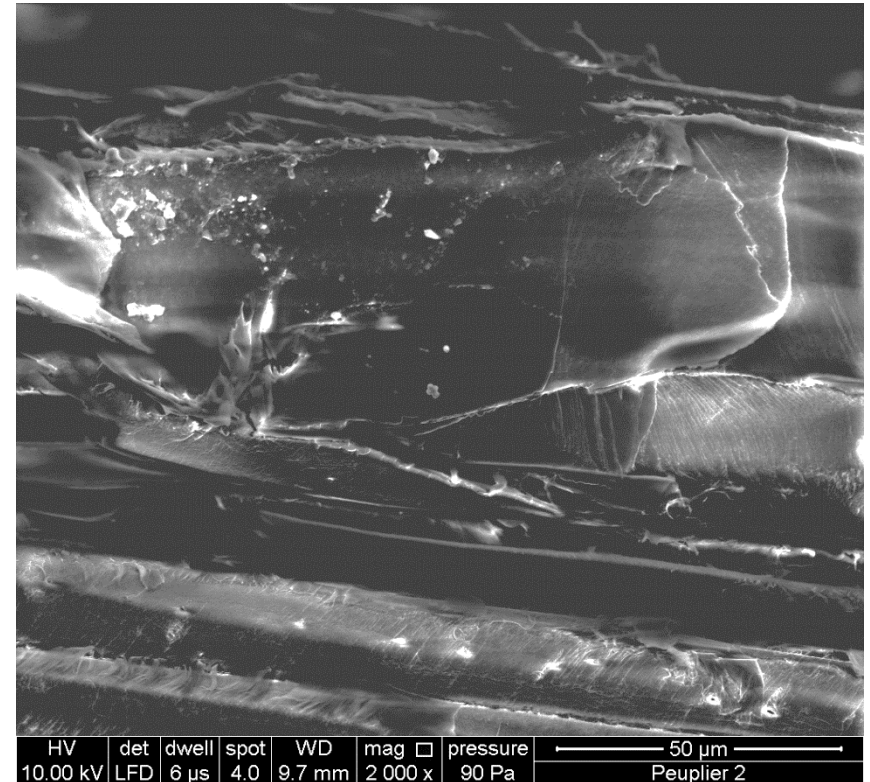
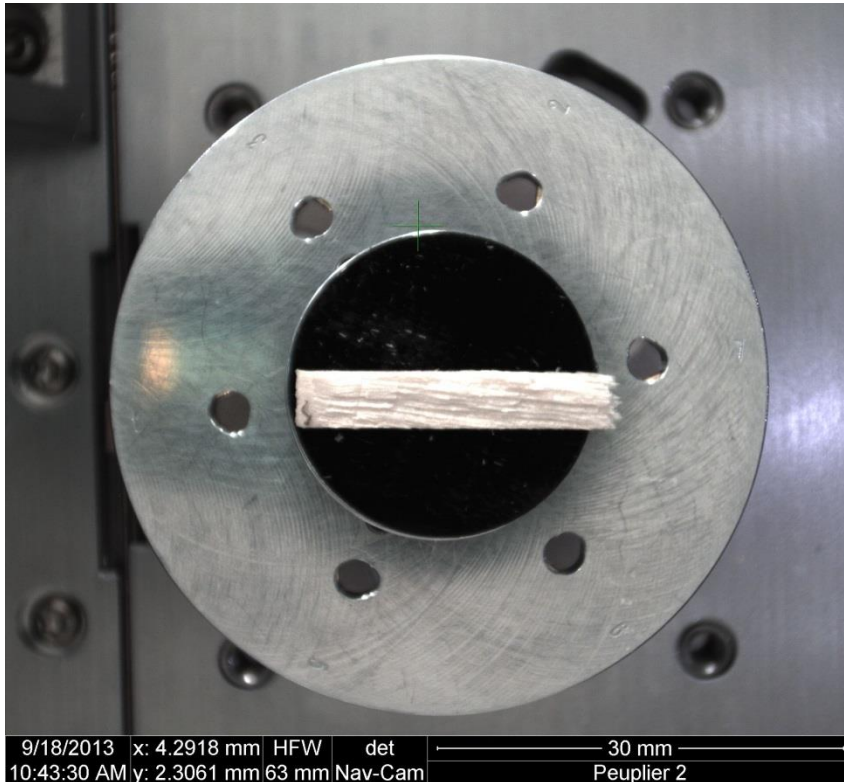
Bacteria on wood



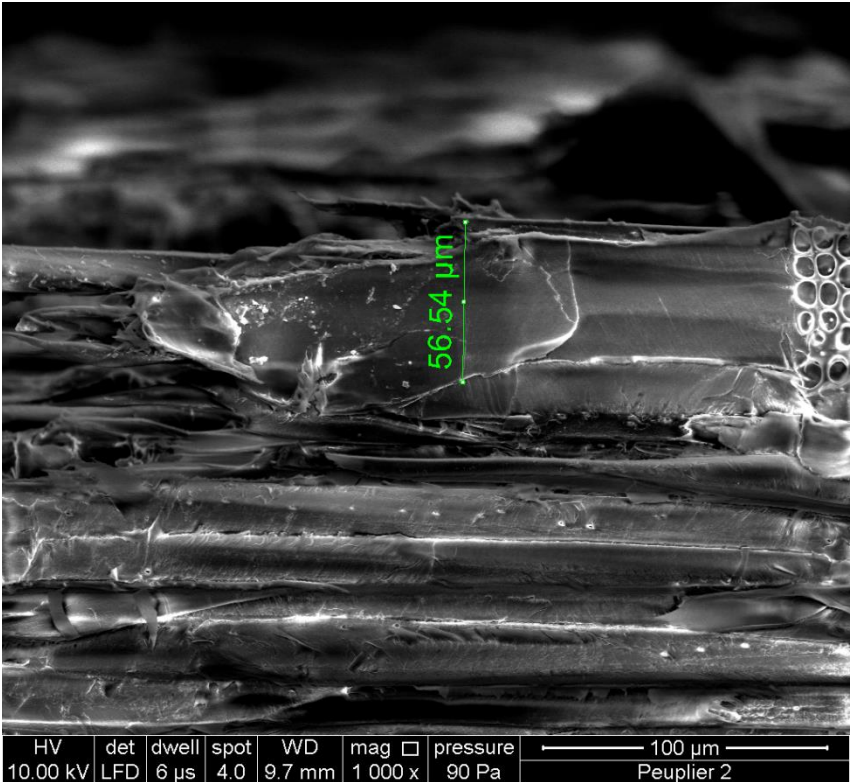
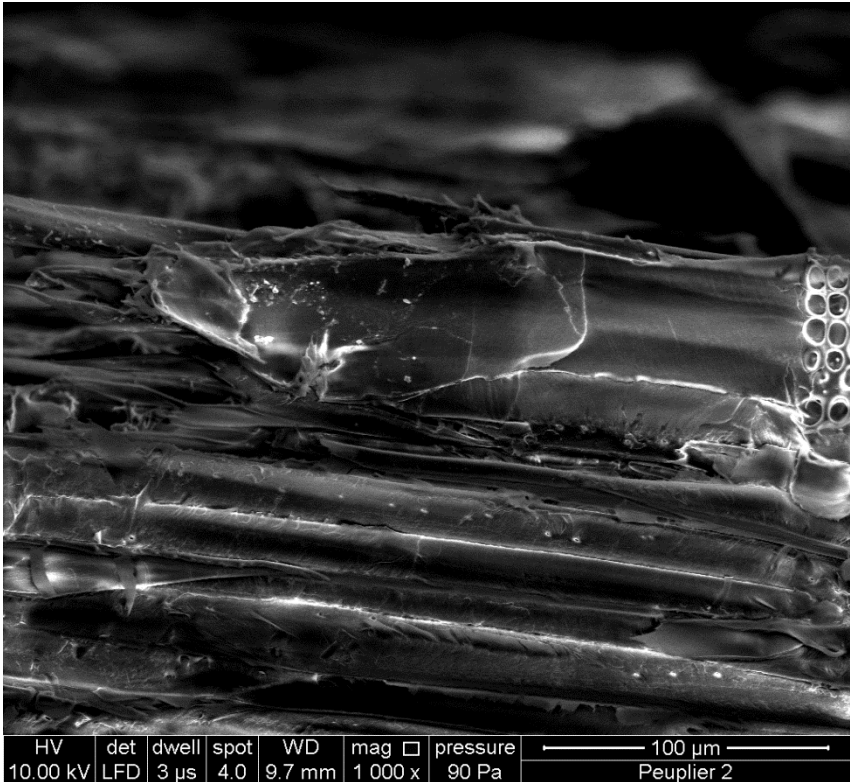
Bacteria on wood

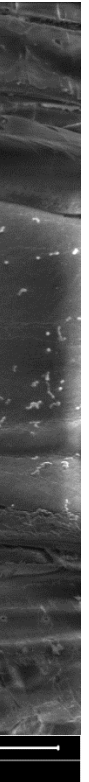
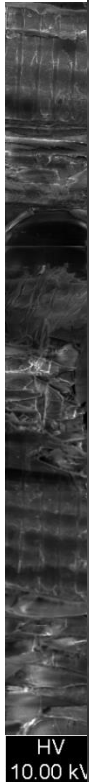


Bacteria on wood



Bacteria on wood



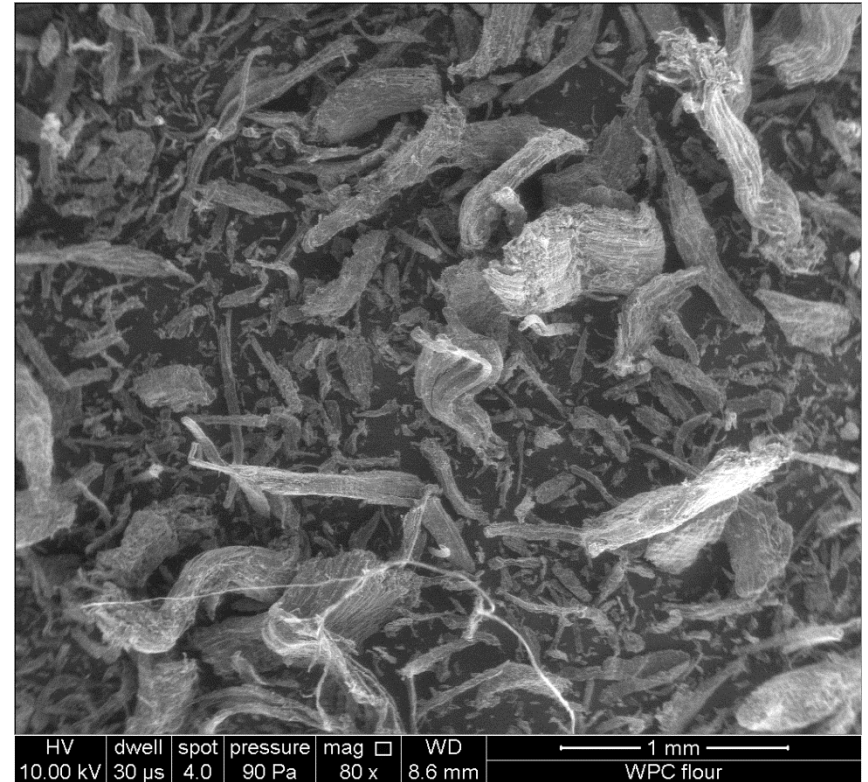
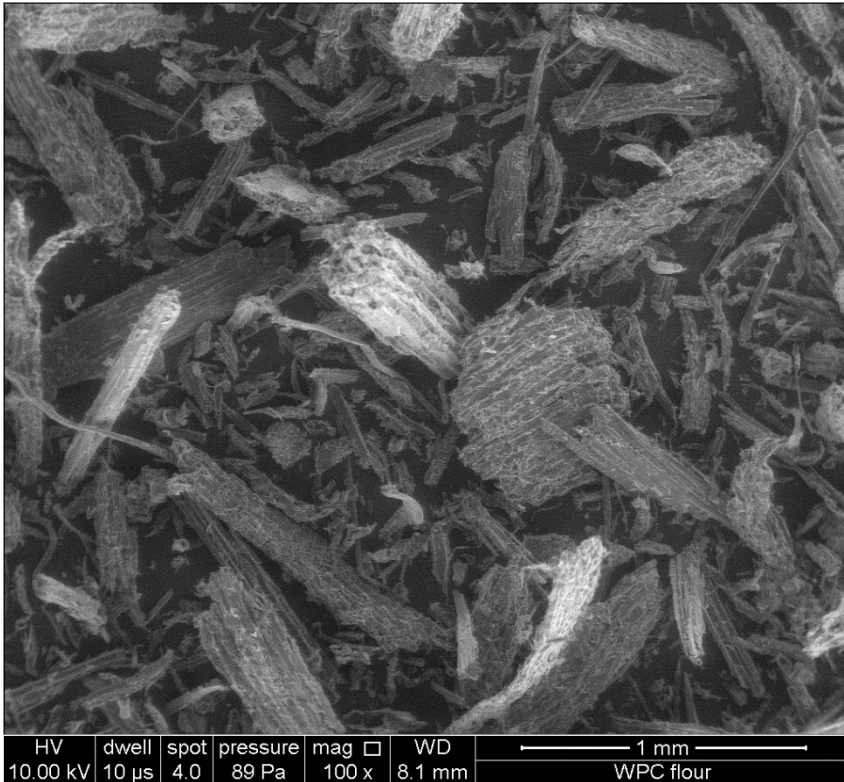


HV
10.00 kV

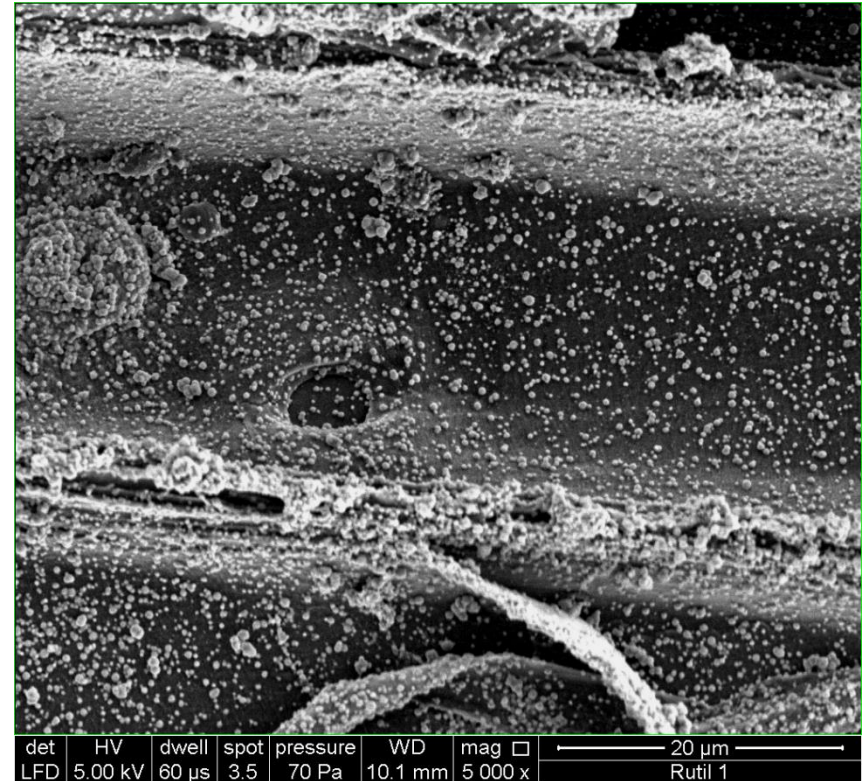
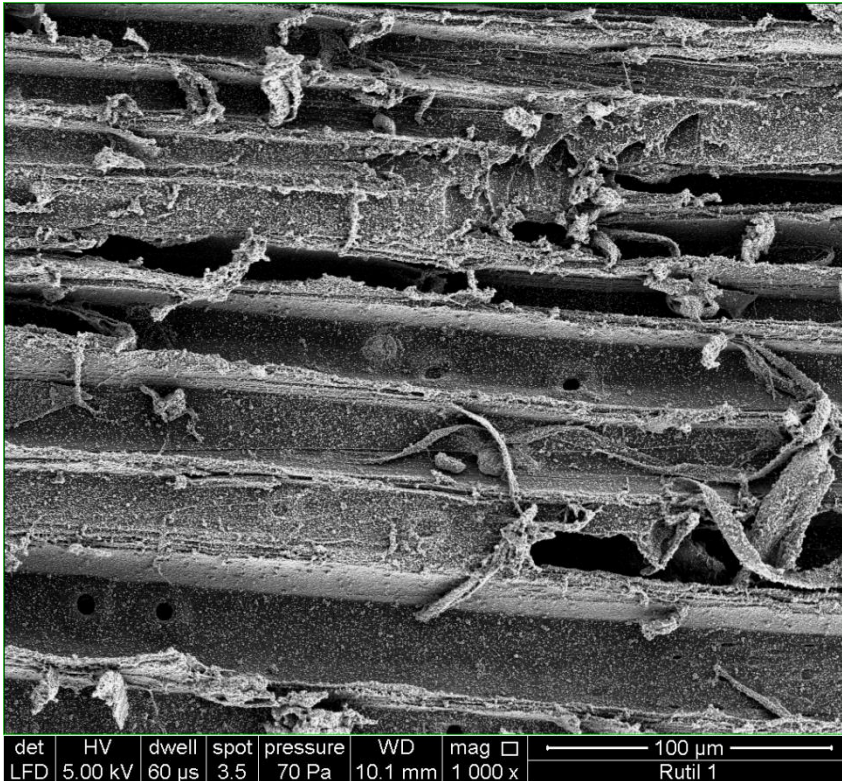
HV	det	dwell	spot	WD	mag	□	pressure
10.00 kV	LFD	10 μ s	4.0	9.7 mm	8 000 x		90 Pa

10 μ m
Peuplier 2

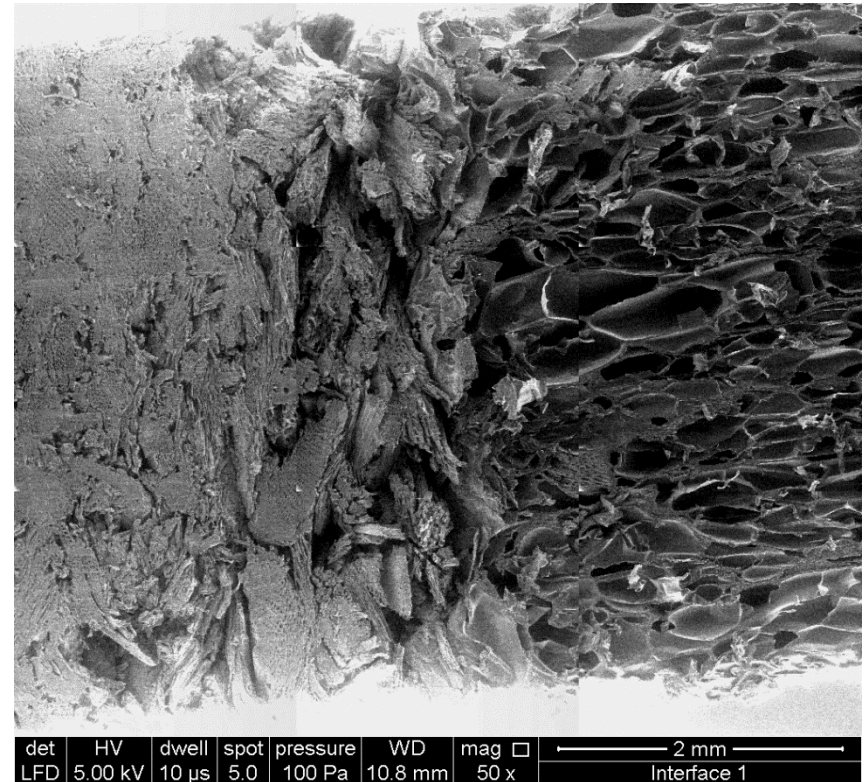
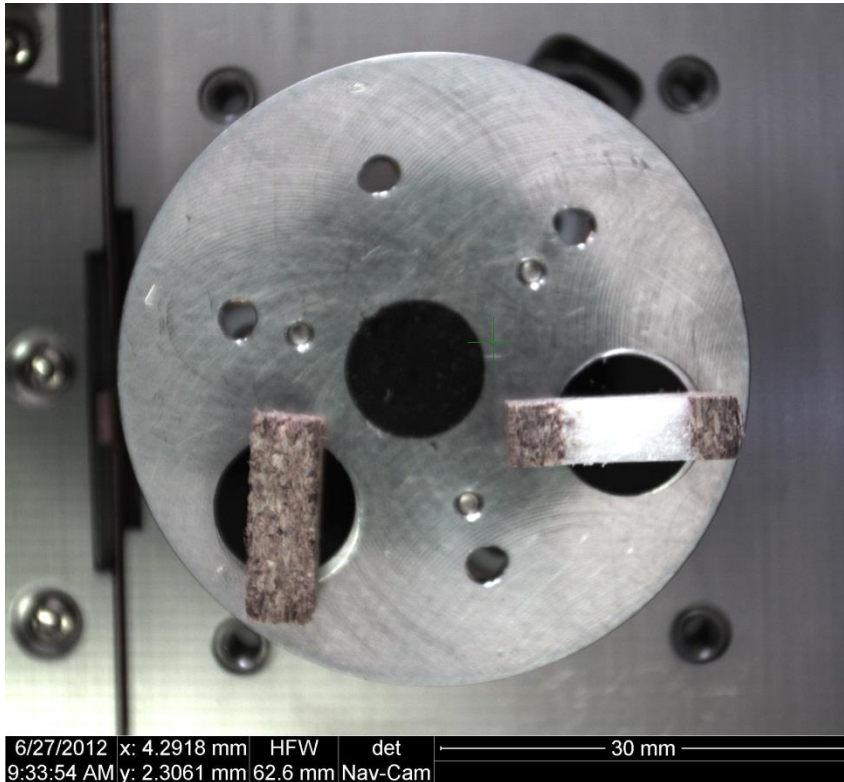
Wood Plastic Composites



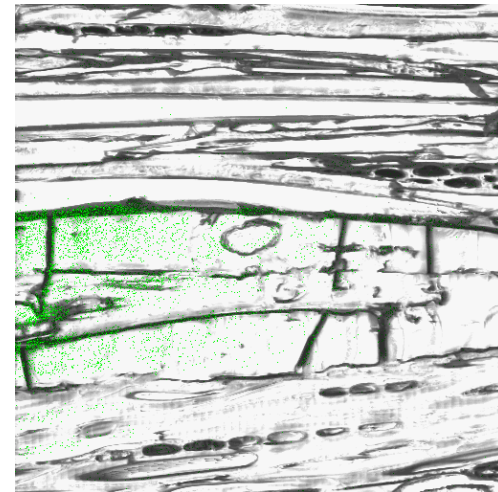
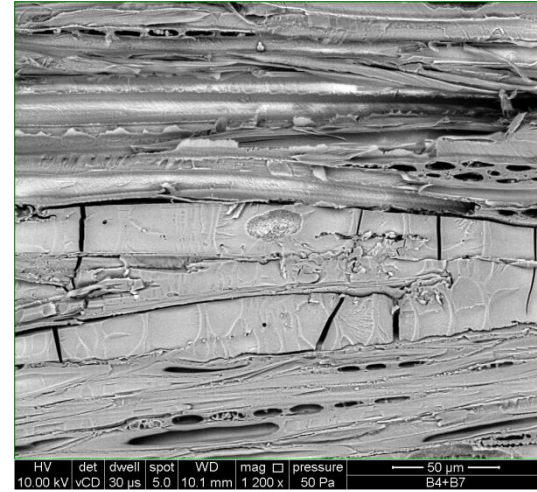
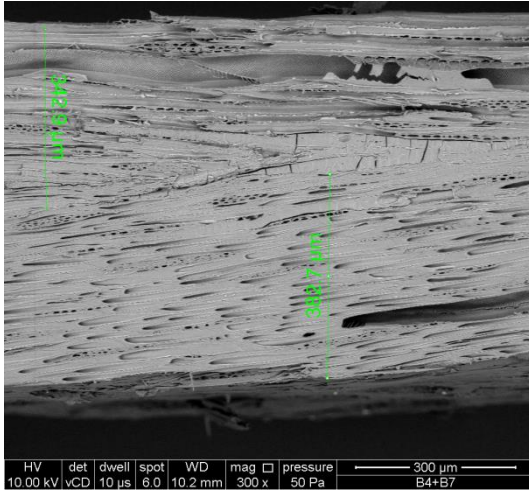
Wood and metals



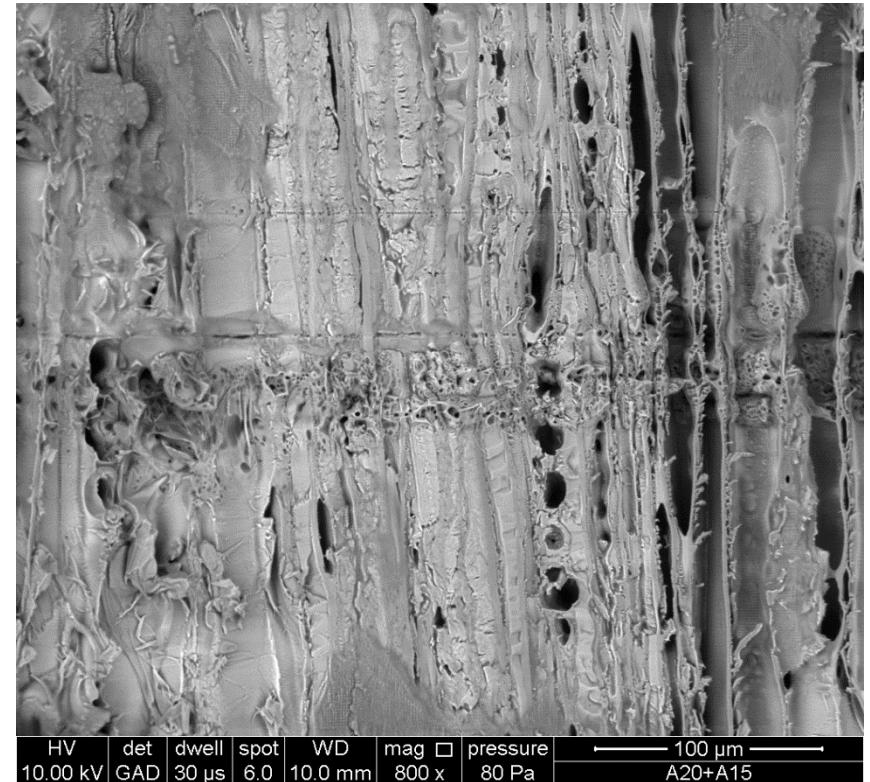
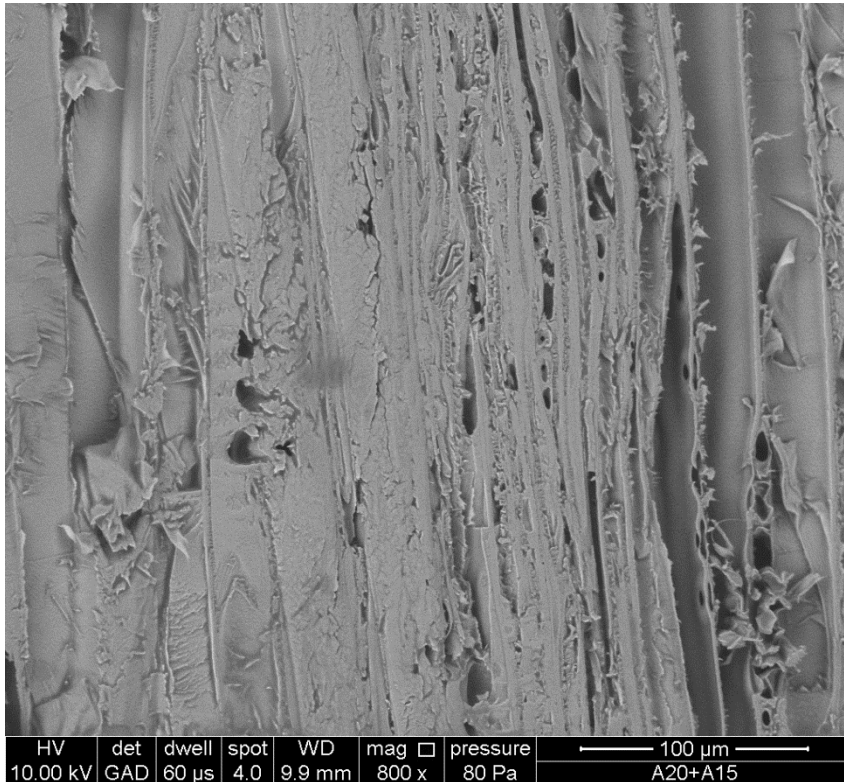
Novel wood products



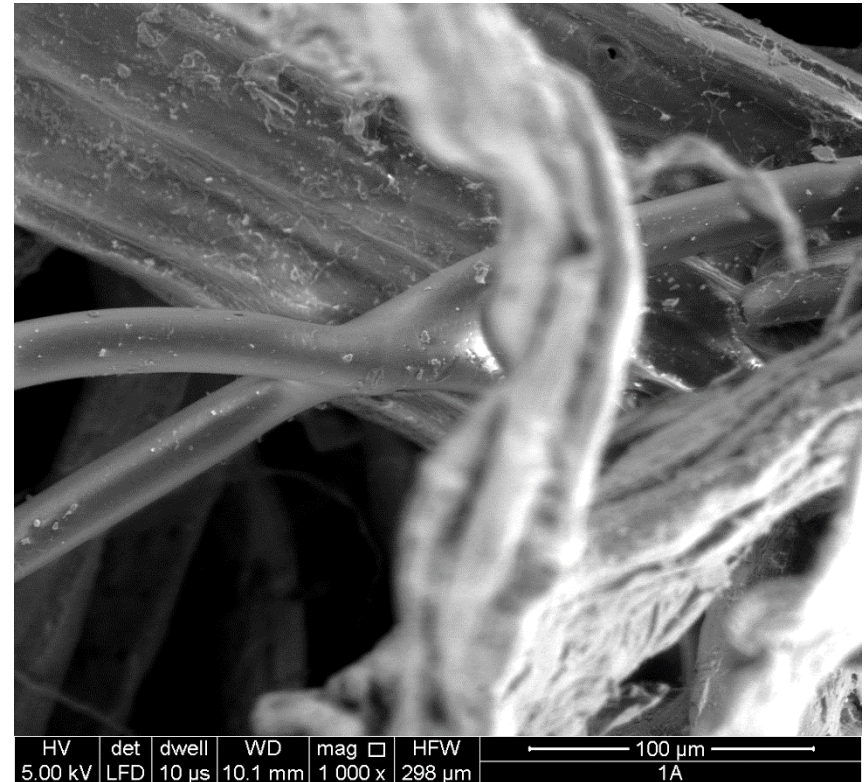
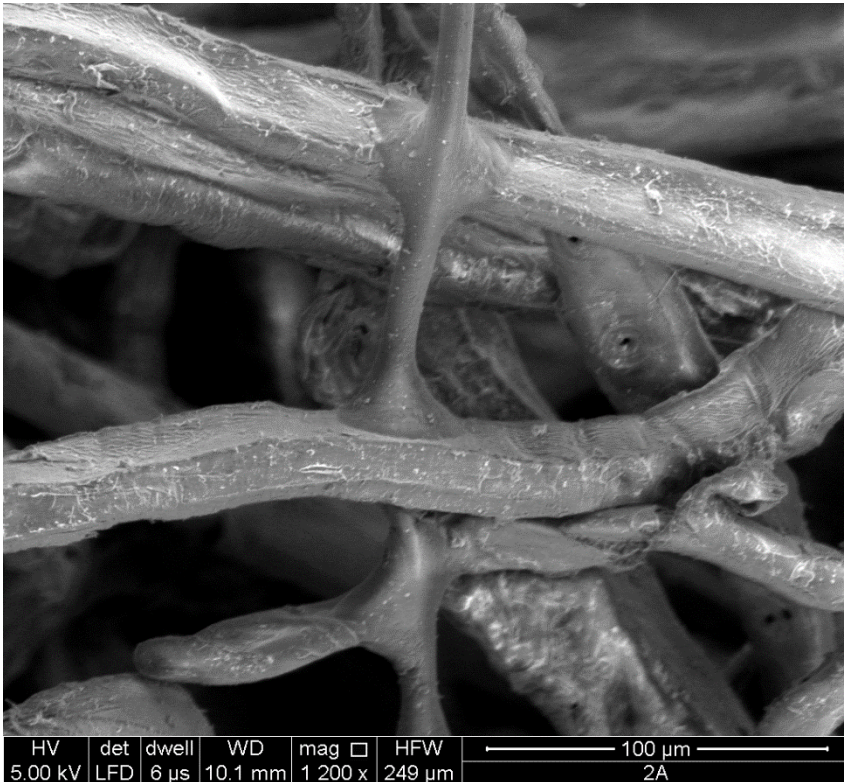
Adhesive distribution



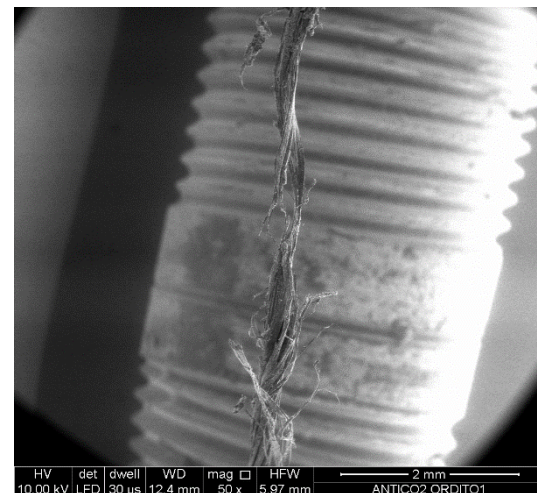
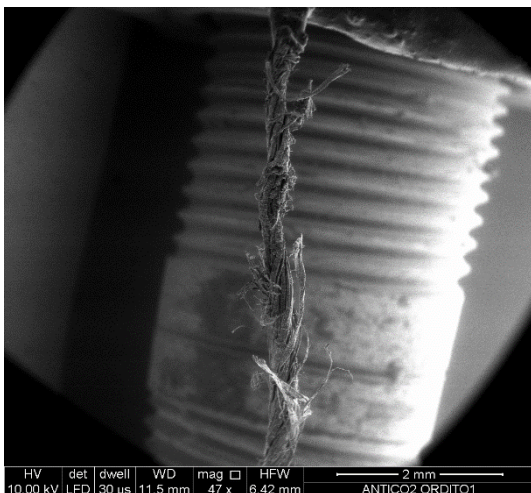
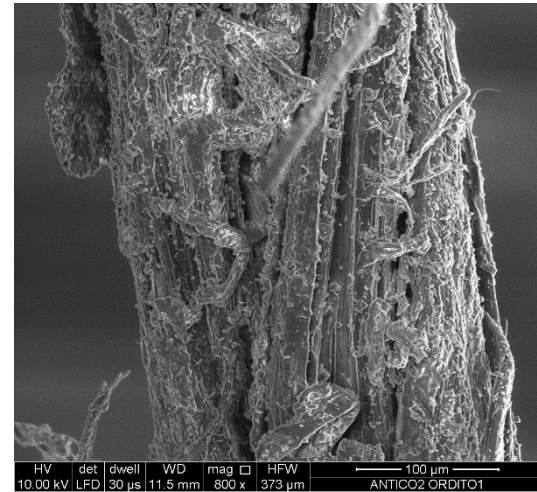
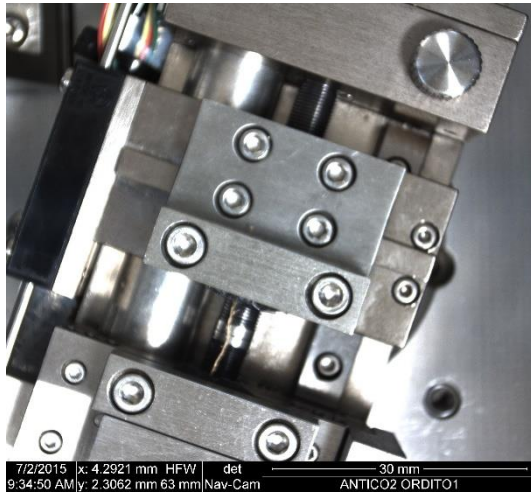
Sample burning during line scan



Novel wood-plastic insulation



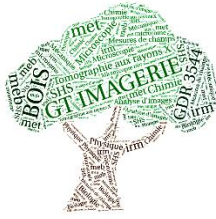
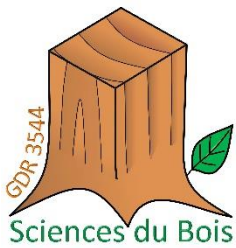
Mechanical testing





Conclusions

- ESEM invaluable tool for wood science
 - Control moisture content
 - Normally non-destructive
- We need help with
 - imaging liquid samples
 - improving clarity of images in ESEM mode
 - obtaining clearer EDAX images



Groupe de Travail Bois et Imagerie



GDR 3544 Sciences du bois, <http://www6.inra.fr/gdr-sciences-du-bois/>

Objectif : faire le point sur les techniques d'imagerie appliquées au bois pour favoriser les échanges interdisciplinaires entre les laboratoires partenaires du GDR.

Actions :

Etat des lieux (Equipements, plateformes, compétences), Méthodes d'imagerie non destructives, microscopie, Traitement et analyse d'images, Mesures de champs mécaniques,

Partage d'expériences via les réunions des journées annuelles du GDR Bois, de journées thématiques (eg : 11 et 12 mai 2016)

Partage de ressources : mise en relation avec d'autres réseaux (microscopie, analyses d'images etc...). réalisation de banque de données/images.

Site web : <http://www6.inra.fr/gdr-sciences-du-bois/Groupes-de-travail/Bois-et-Imagerie>

Contact : sabine.care@ifsttar.fr

Thanks for listening

- Mark Irle
- Ecole Supérieure du Bois, Nantes
- mark.irle@ecoledubois.fr

