

Evaluation of wood veneers for furniture production by FT- NIR

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Research Project:

- Verify the wood quality for furniture production;
- Identify different woods;
- Solve technical problems (colour, finishing quality, ...).



Material

Methods

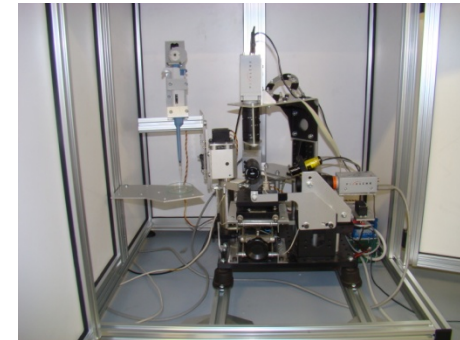
microscopic observations



colour measurement: DataColor, Maya2000Pro and hyperspectral imaging



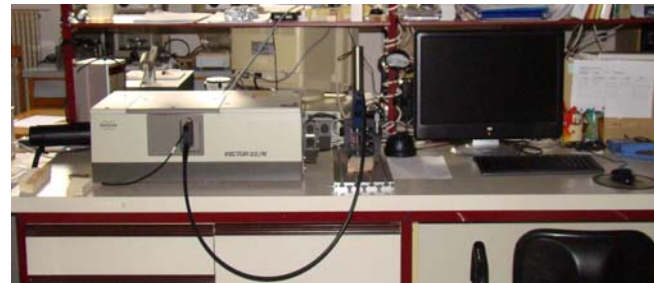
wettability



XRF



FT-NIR



Objectives of the NIR measurements:

- to create a data base of NIR spectra
- separate the investigated veneers
- NIR as a quality control of wood veneers before manufacturing process

NIR material and methods

Four set of samples:

1: rovere millennium

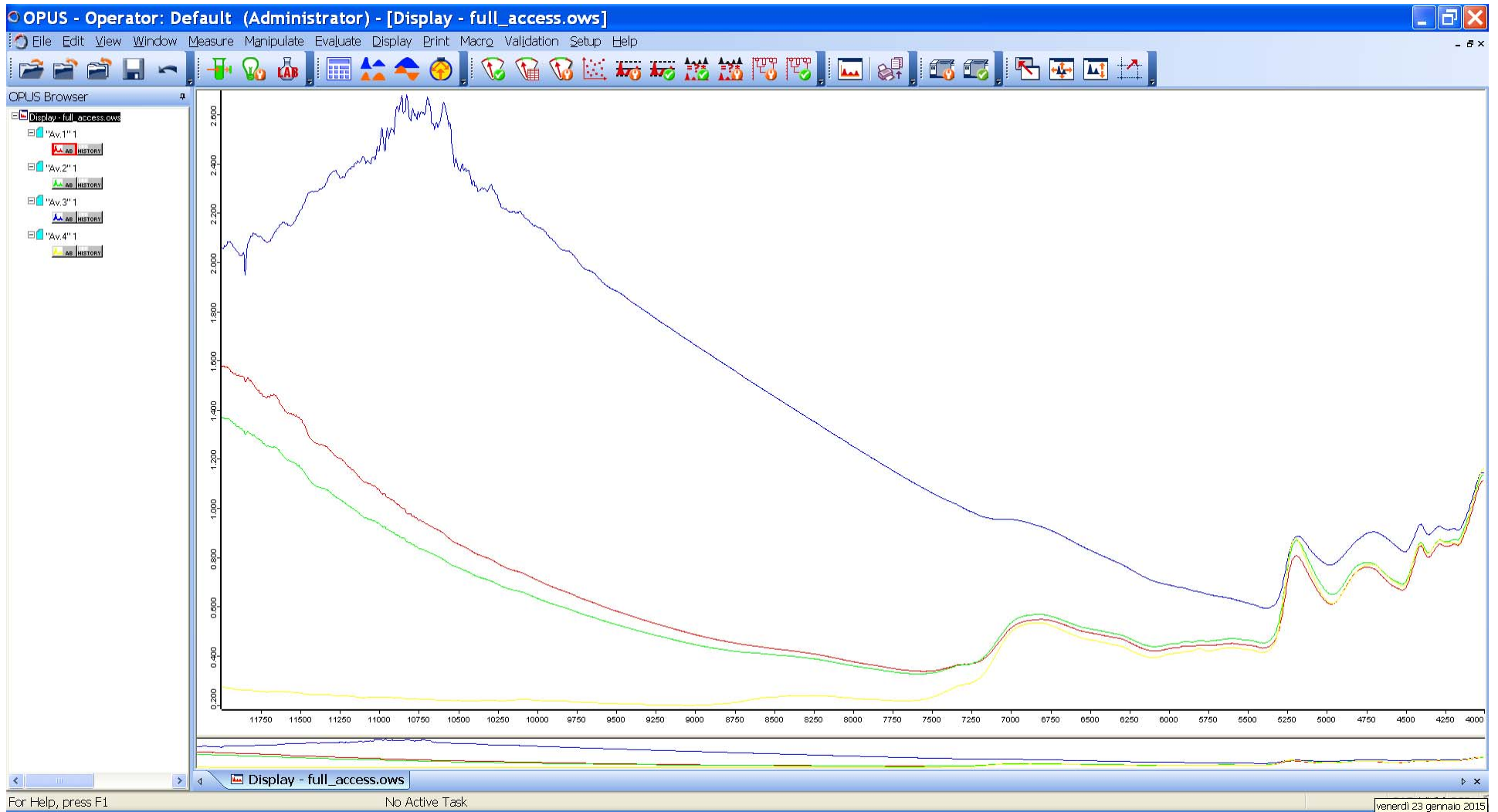
2: rovere market

3: passion oak nero

4: rovere naturale

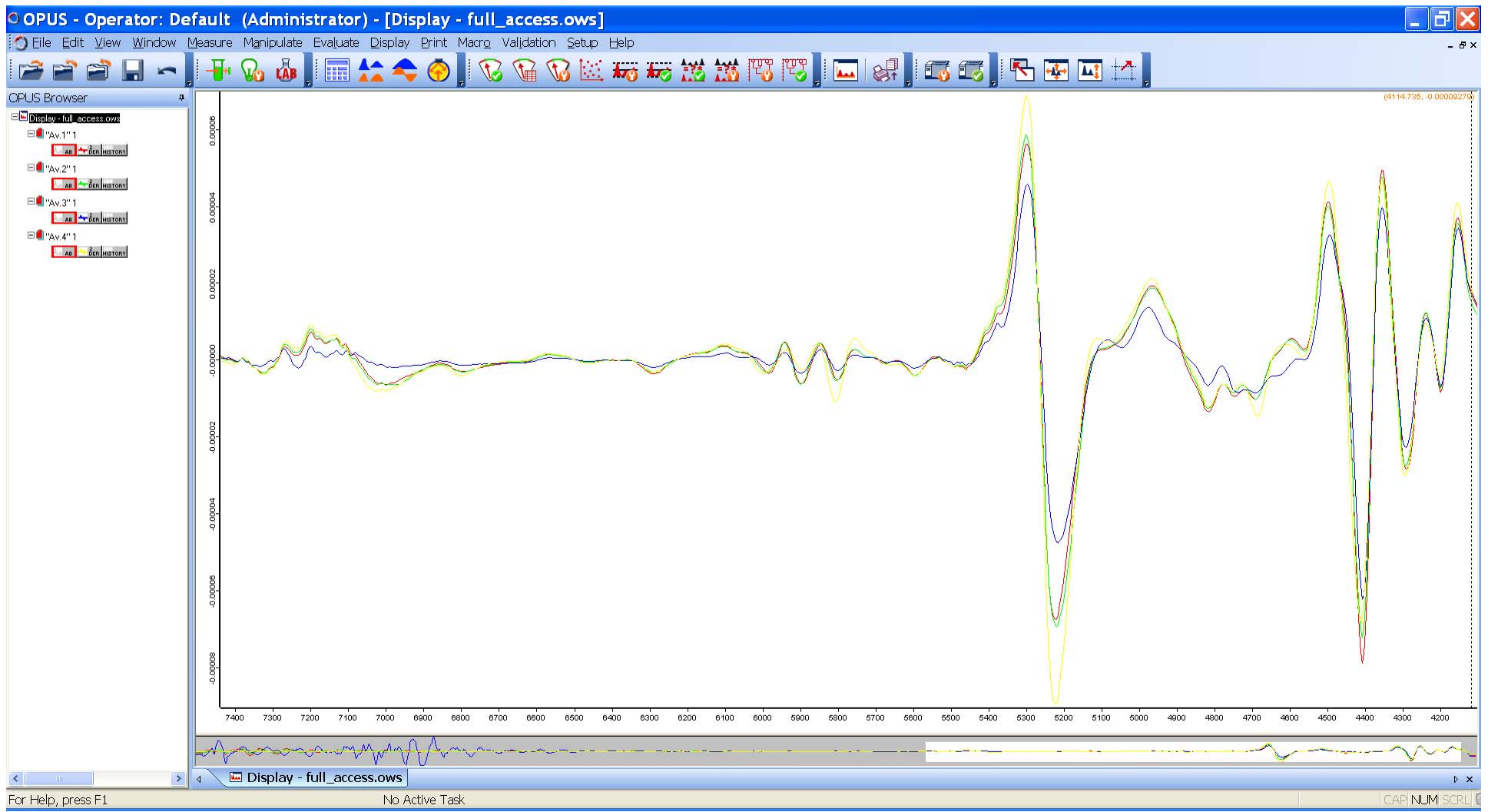


Raw spectra

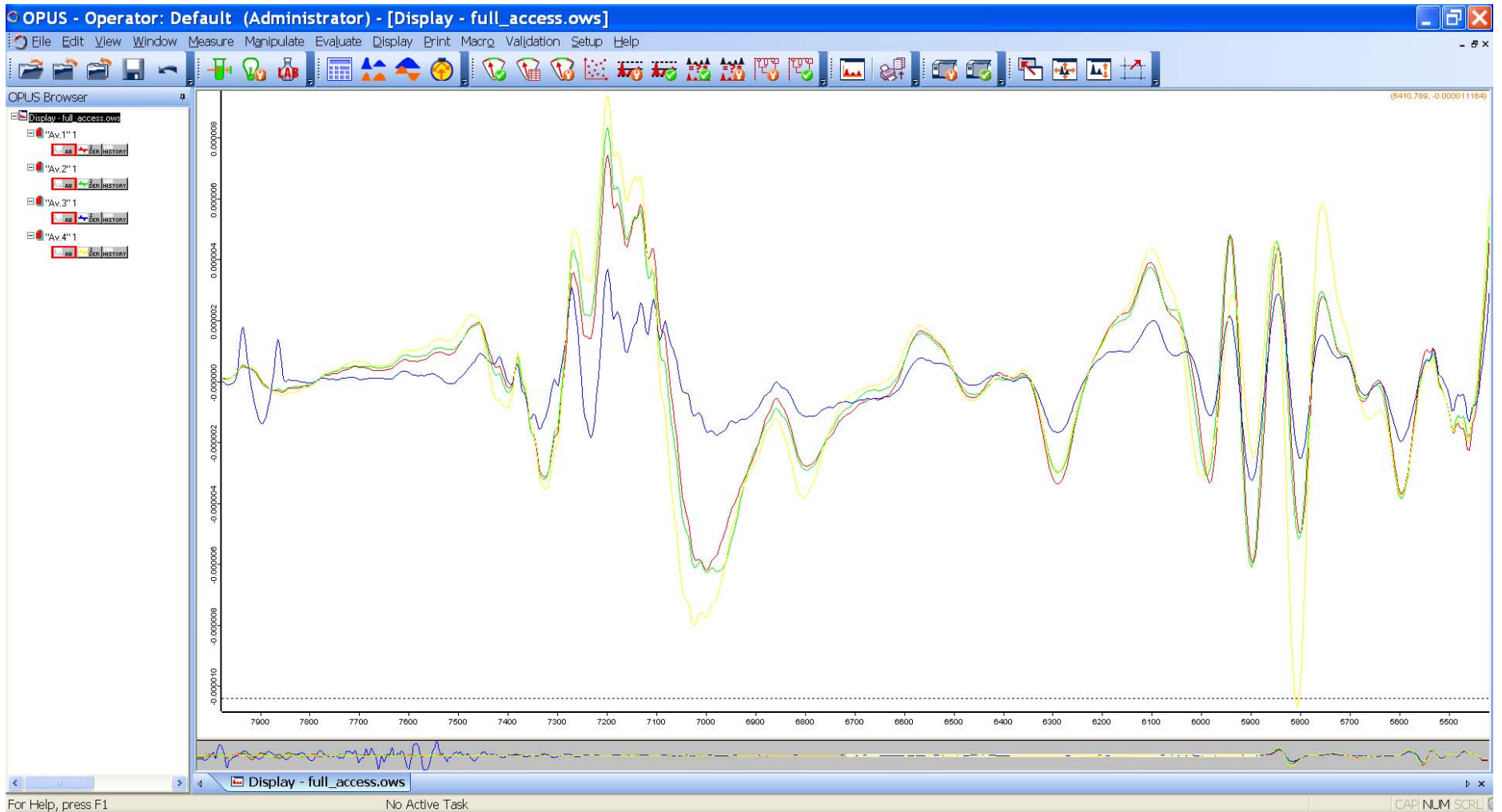


Two groups: black and natural oak and oak millenium and market

Second derivative

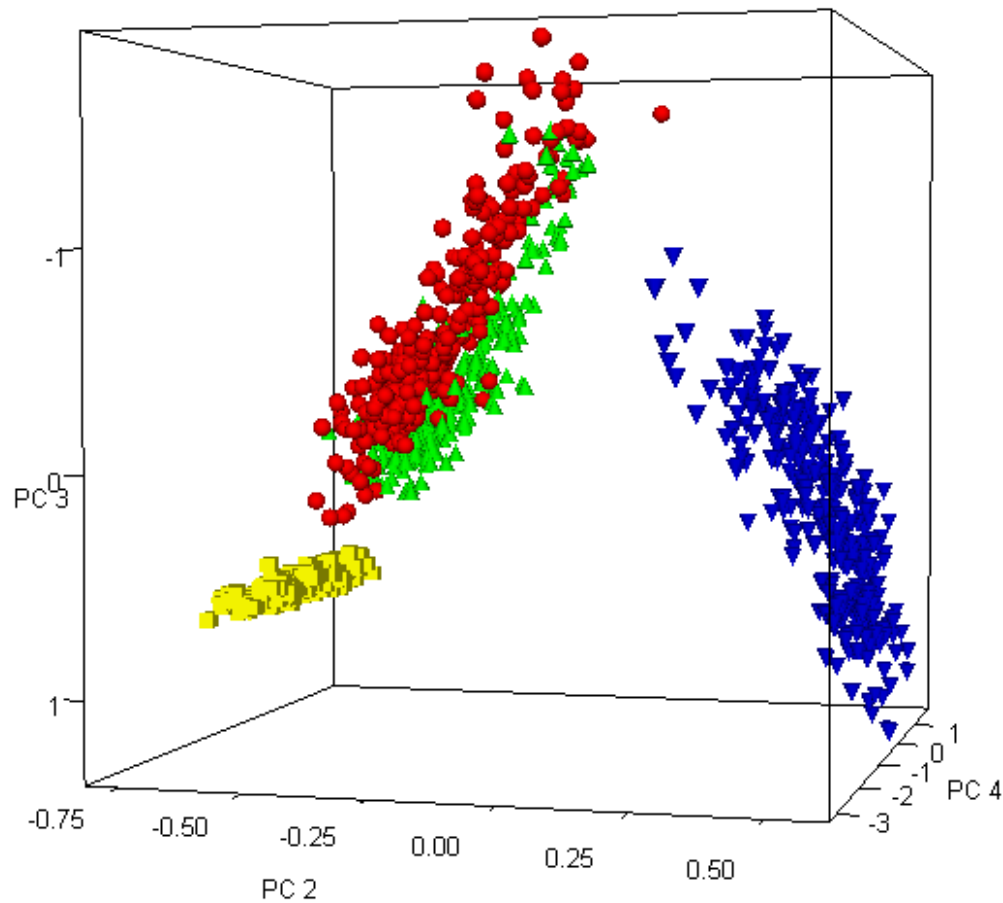


Second derivative



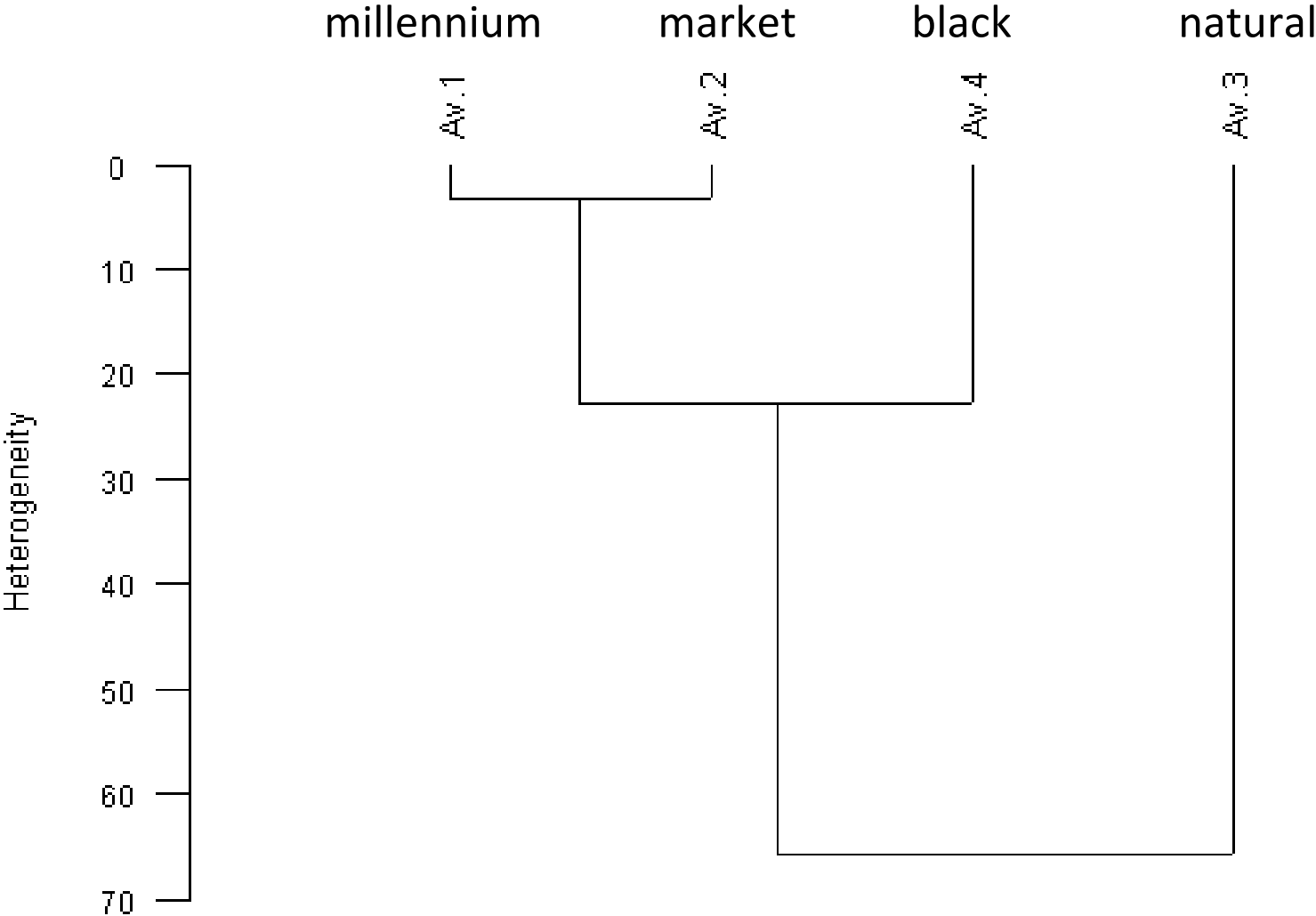
functional groups of hemicelluloses and hydroxyl groups

Principal Component Analysis



PCA of investigated veneers in spectra range: 11500-4100 cm^{-1} (no spectra preprocessing). Samples coding: ● 1, ▲ 2, ▼ 3, ■ 4

Cluster analysis




Identity test

a)

Result of IDENT evaluation:

Sample name: wood
Sample: C:\backup computer lab\valcucine\1\1030.0
Date and time (measurement): 2014/12/03 13:06:33 (GMT+1)
Method file: C:\backup computer lab\valcucine\analysis\for report.faa

Hit qual.	Threshold	Group	Class Test	NOT PERFORMED,
0.27269	0.69831	1		NOT OK
0.40312	0.16616	3		
0.43163	0.60917	2		
1.13380	0.07124	4		

b)

Result of IDENT evaluation:


Sample name: Spruce
Sample: C:\backup computer lab\valcucine\2\2009.0
Date and time (measurement): 2014/11/17 15:30:53 (GMT+1)
Method file: C:\backup computer lab\valcucine\analysis\for report.faa

Hit qual.	Threshold	Group	Class Test	NOT PERFORMED,
0.14868	0.69831	1		NOT OK
0.30946	0.60917	2		
0.52512	0.16616	3		
1.04265	0.07124	4		

c)

Result of IDENT evaluation:


Sample name: wood
Sample: C:\backup computer lab\valcucine\3\3141.0
Date and time (measurement): 2014/12/04 13:31:03 (GMT+1)
Method file: C:\backup computer lab\valcucine\analysis\for report.faa

Hit qual.	Threshold	Group	IDENTIFIED AS 3	
0.07839	0.16616	3		OK
0.73136	0.69831	1		
0.87649	0.60917	2		
1.43179	0.07124	4		

d)

Result of IDENT evaluation:

Sample name: Spruce
Sample: C:\backup computer lab\valcucine\4\4029.0
Date and time (measurement): 2014/11/17 13:42:56 (GMT+1)
Method file: C:\backup computer lab\valcucine\analysis\for report.faa

Hit qual.	Threshold	Group	IDENTIFIED AS 4	
0.00405	0.07124	4		OK
0.78988	0.60917	2		
0.92250	0.69831	1		
1.40018	0.16616	3		

PLS-DA analysis

	actual				
predicted		Class 1	Class 2	Class 3	Class 4
	Class 1	181	93	0	0
	Class 2	111	206	0	0
	Class 3	2	0	300	0
	Class 4	6	1	0	298

Prediction of the class

Conclusions #1

- It was possible to discriminate investigated veneers;
- Averaged spectra of **Oak Millennium** and **Oak Market** veneers exhibit similar shape;
- The samples representing class 3 (**black oak**) and class 4 (**natural oak**) were **correctly separated** from others by means of all chemometric methods

Conclusions #2

- Veneers from group **1 and 2** were obtained **from archaeological oak logs, but of different provenance;**
- Developed data base might serve in the future.