This article talks about a study which was conducted on Scots pine knowing that the properties of wood can be enhanced by deforming the first few layers which will lead to a desired densification. Wood is usually softened by heat/steam and surface densification can increase the hardness of the wood. The article explains that the glossiness attained from densification is a result from a thin layer that forms as well as the canal migration, but in the Scots pine there has been no chemical evidence to prove the visual evidence. XPS was used in this experiment to analyze the surface changes of the wood because XPS can help analyze the surface up to a depth of 10 nm. The experiment was conducted in order to evaluate the chemistry changes at the surface and to check if the chemical evidence for canal migration can be seen.

The samples used were heartwood and sapwood, cut from dried scots pine, in sizes of (150X20X30mm3); some freshwood was also used as a control in their experiment. All of the samples were placed in a room with humidity at 65% and 20°C for one month and were smoothed with a grid paper 1200. The samples were densified by the Branson 2700 linear vibration welding machine at a frequency of 100 Hz at amplitude of 3 mm, and heating pressure of 2.2 MPa. "Thin strips were cut from the samples before and after acetone extraction and were measured by XPS."

Two or three pieces from the sample were analyzed by XPS, the samples the authors took were from random locations. The focus in their experiment was on the extractive migration to the surface, "the acetone—soluble extract from the heartwood and sapwood were 8.4% and 3.7% respectively".

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Figure 1a shows the effect of the non-extracted heartwood and the extracted heartwood which show that a layer at the surface is formed by both the non-extracted and extracted samples. Figure 1b shows the extracted and non-extracted sapwood samples and it indicates that there's an incomplete layer formed.

Figure 2.

Figure 2 A and B show the sapwood which was changed by friction, the dark spots in this figure are due to the migration to the surface of the extractives.
Conclusion

The article says that there are significant changes in the samples that were analyzed by XPS due to the method of densification. Some samples showed a thin layer forming at the surfaces while others showed an incomplete layer. Densification of the Scots pine can help with resistance against biological degradation and according to the authors we would no longer need to coat the wood.