

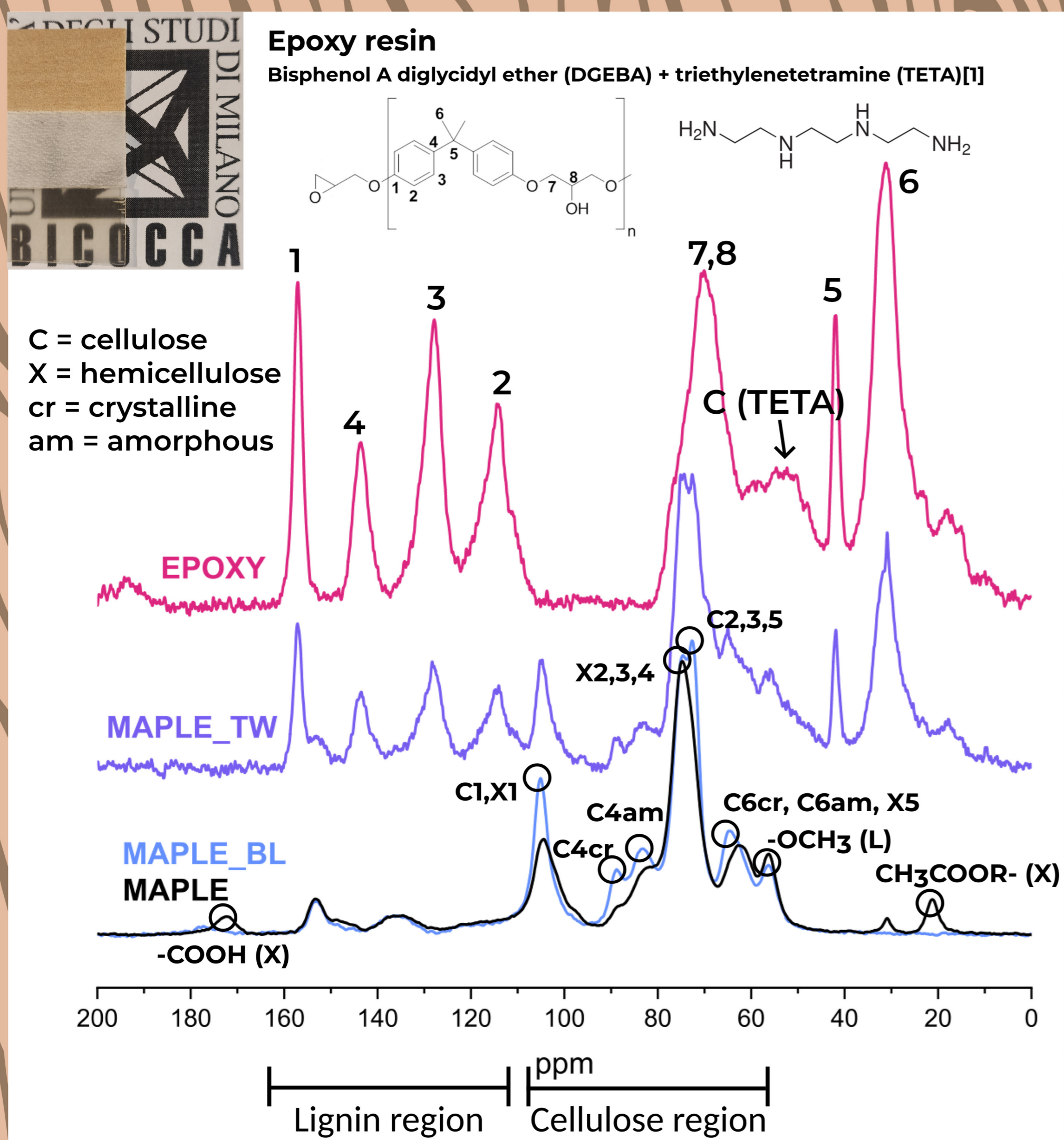
CP-MAS NMR and optical characterisation of transparent wood composite for optical diffusers application

L. Squitieri^{1,2}, A. Bianchi², M. Mauri¹, R. Simonutti¹

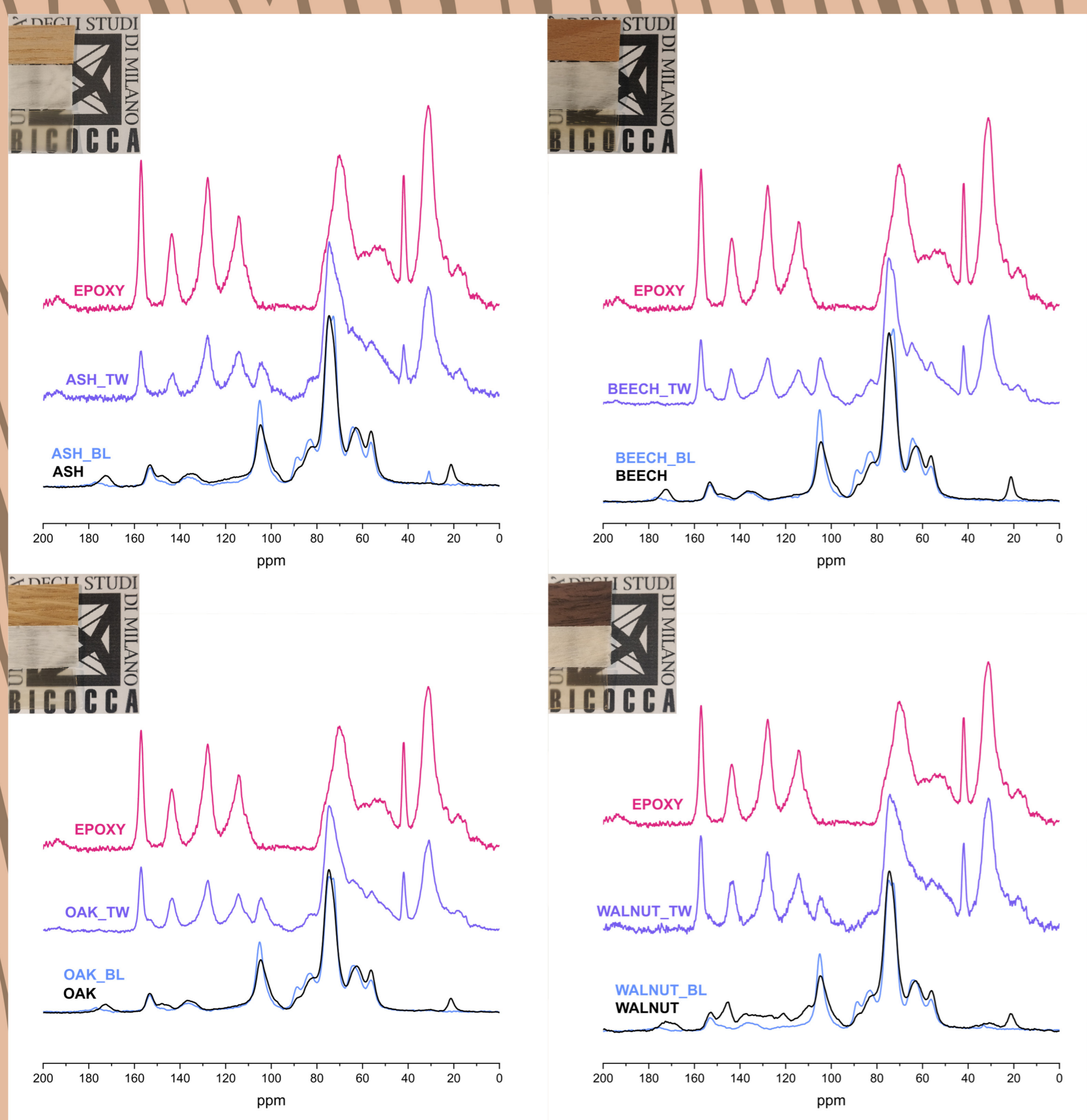
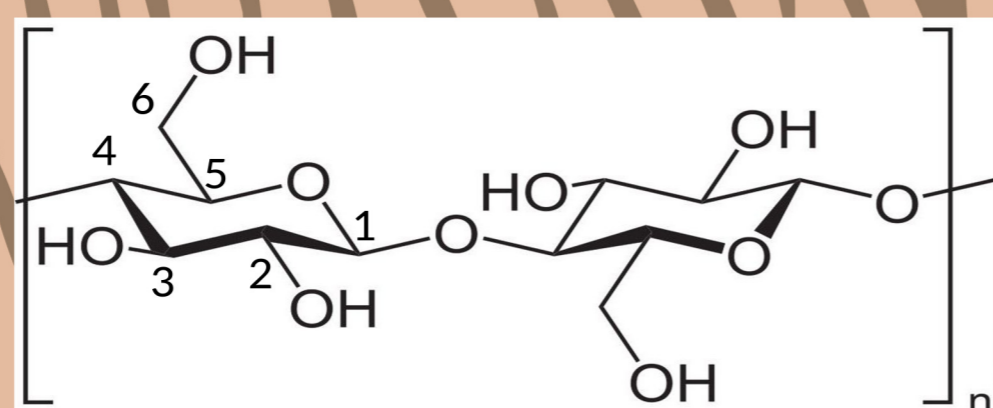
¹University of Milano-Bicocca, Department of Materials Science

²Graftonica s.r.l.

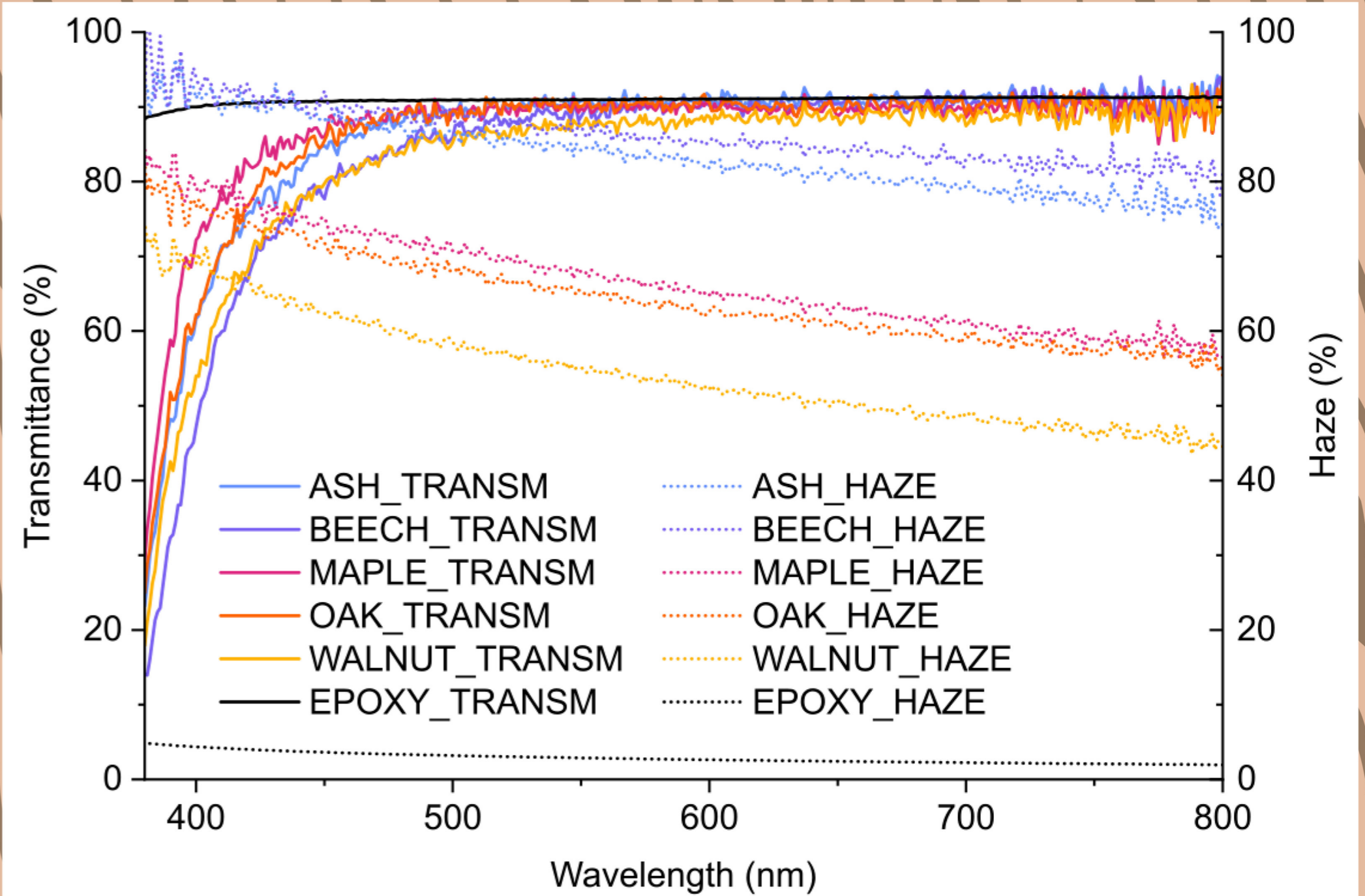
CP-MAS ssNMR measurements



CP-MAS ssNMR detects the presence of lignin in bleached (BL) wood, confirming the elimination of chromophore groups while limiting the removal of lignin in the wood.



Transmittance and haze measurements



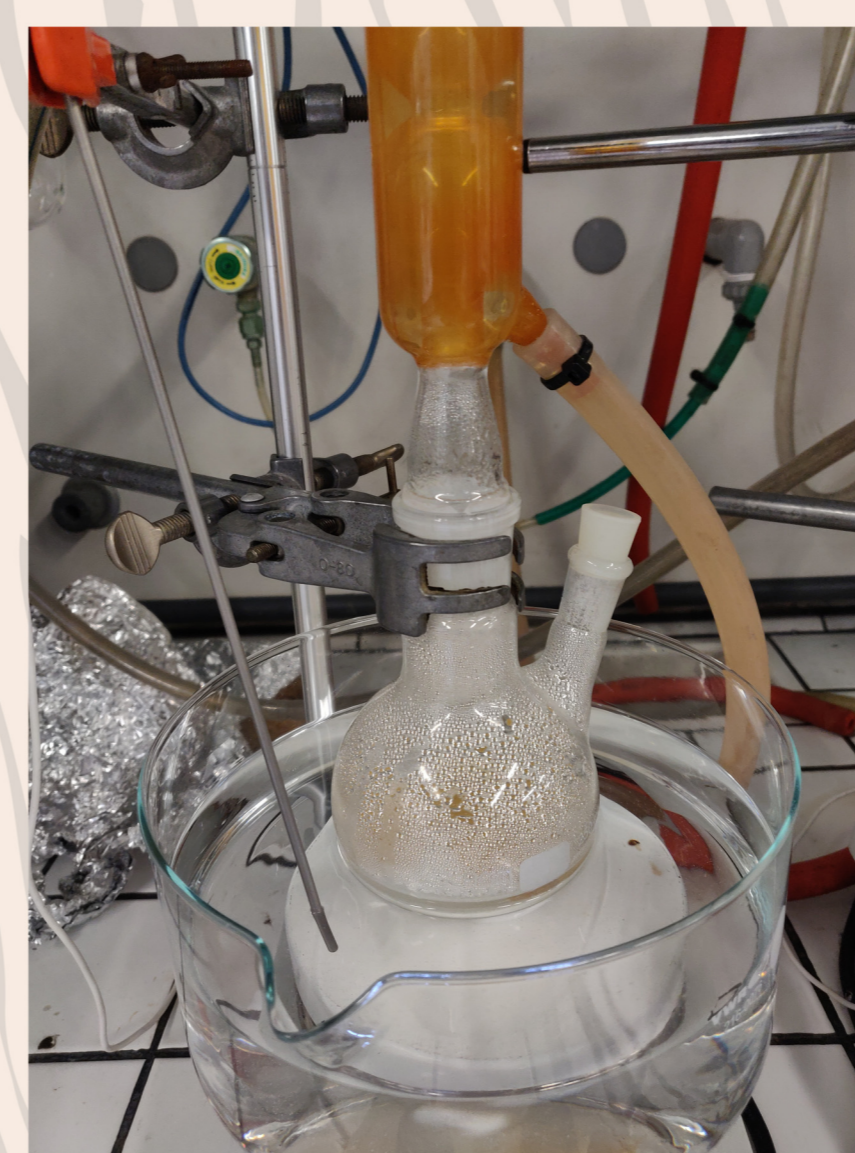
Transmittance and haze measurements performed in an integrating sphere.

Transmittances of TW samples are all very similar at wavelengths between 800 nm and 500 nm, while between 500 nm and the UV region they rapidly decrease. This is due to the absorption of radiation of lignin. [2]

Haze is the percentage of transmitted light that is scattered with a direction deviating more than a specified angle (2.5°) from the direction of an incident beam. The applied formula is the ratio of transmittance of diffused light with total transmittance. [3]

The haze of the transparent wood samples of ash and beech are similar, as are those of maple and oak, while walnut TW has the lowest percentage, indicating a lower capacity for light scattering. Epoxy resin, instead, presents a very low haze.

The transparent wood samples' production method is carried out in two steps: a bleaching step in a hydrogen peroxide solution [4] and a vacuum infiltration step with a bio-based epoxy resin.



Wood bleaching process and vacuum infiltration setup



Acknowledgements

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References

- [1] ACS Omega 2020, 5, 5412-5420
- [2] ACS Sustainable Chem. Eng. 2021, 9, 4, 1427-1442
- [3] ASTM 1003-13
- [4] ChemSusChem 2017, 10, 3445

