Cellulose nanofibrils from wood and bark: Comparison of fibril properties

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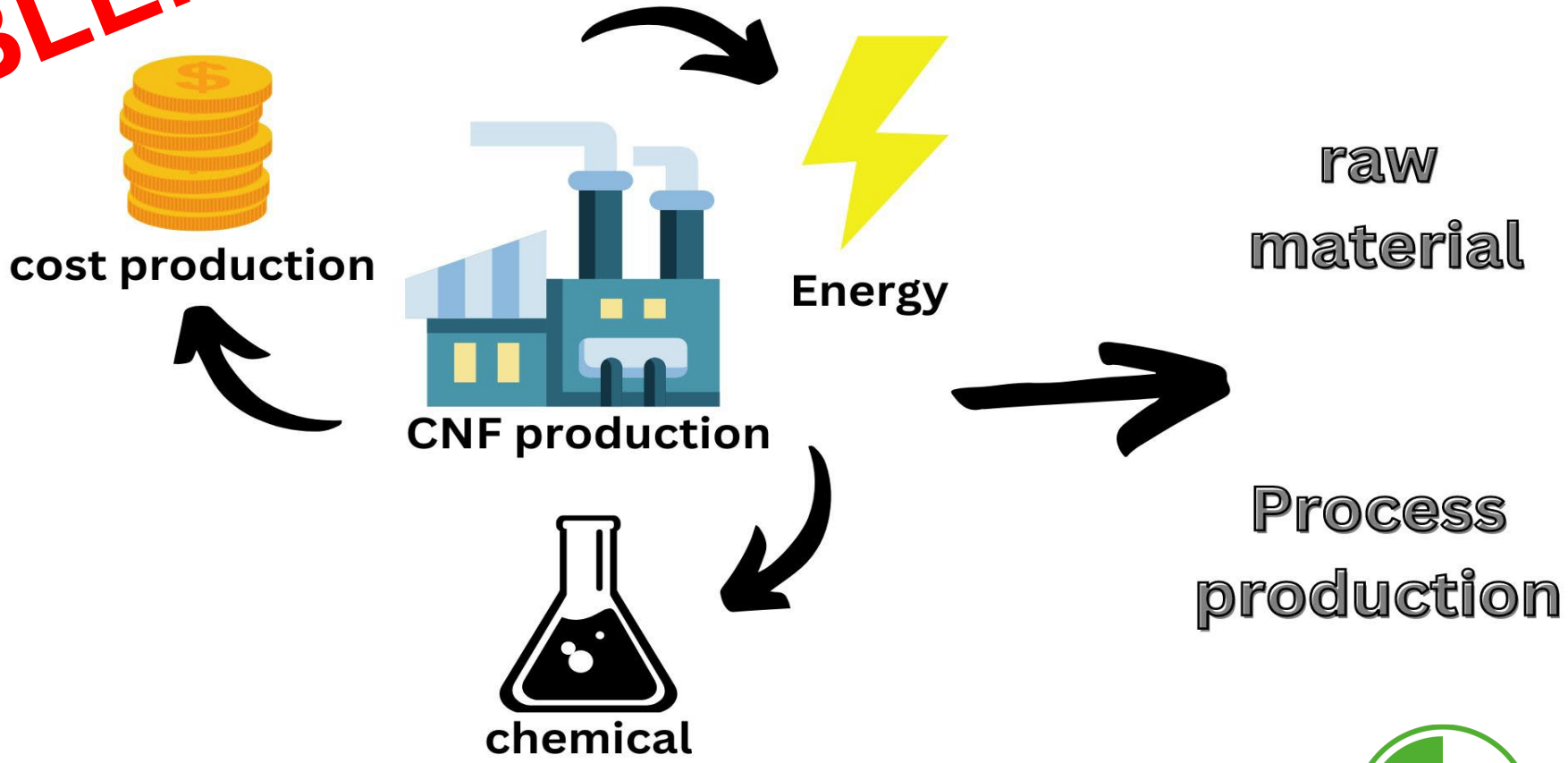
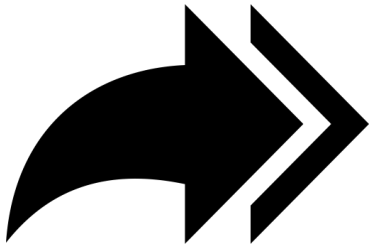
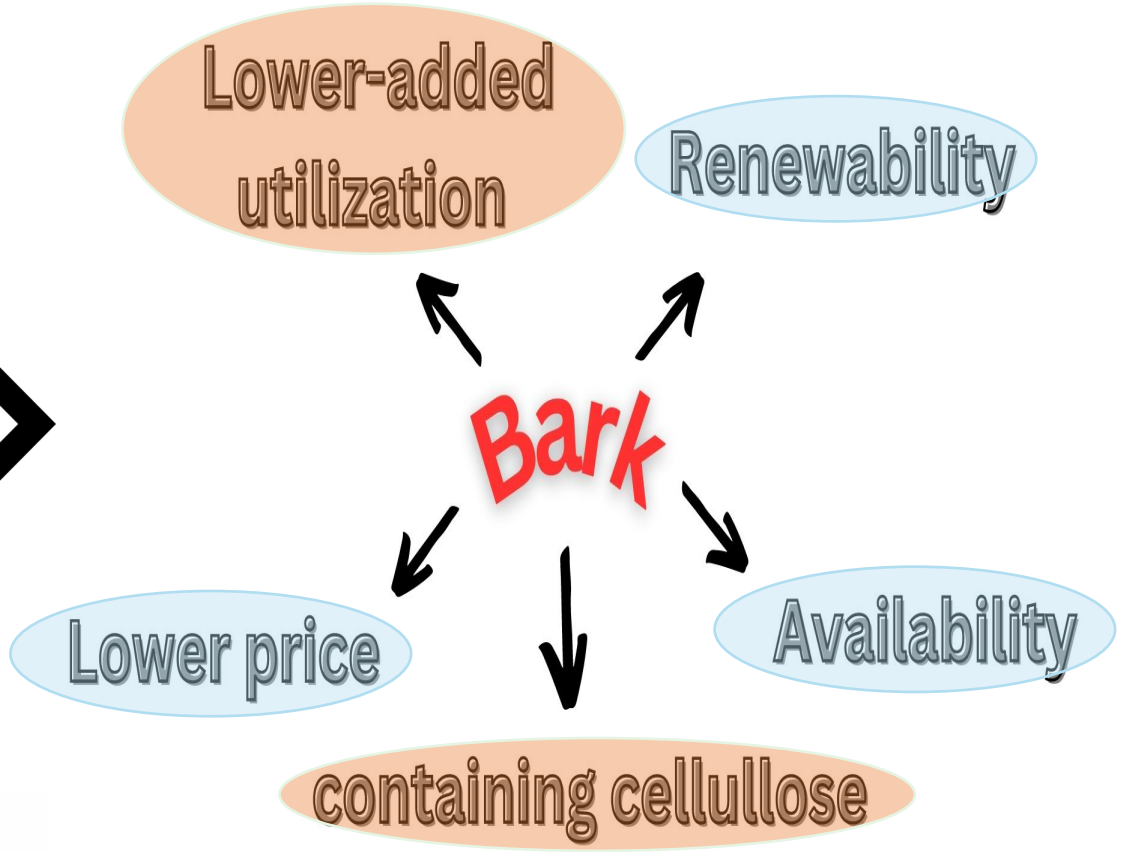
PROBLEM

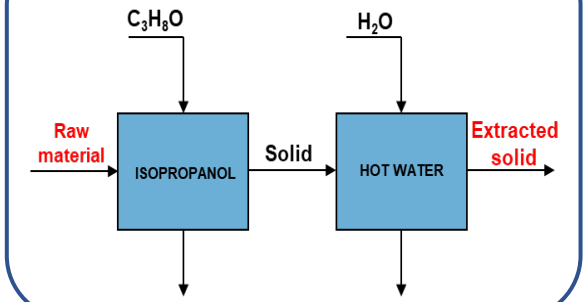

cost production
Energy
raw material
CNF production
Process production
chemical

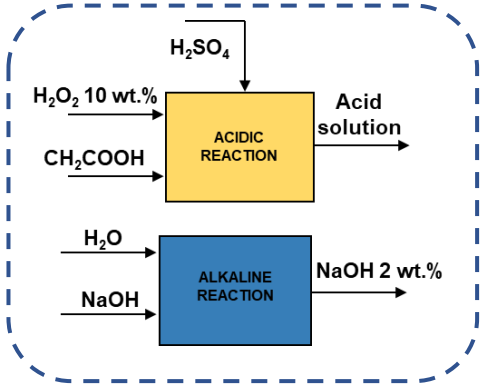
Why the Bark



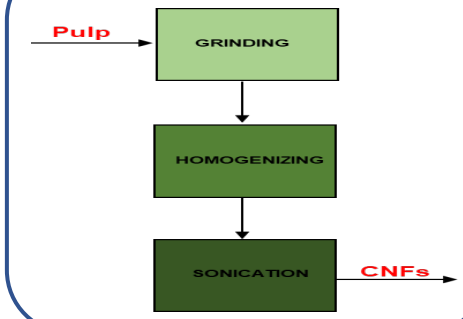

Lower-added utilization
Renewability
Bark
Lower price
Availability
containing cellullose

EXTRACTION

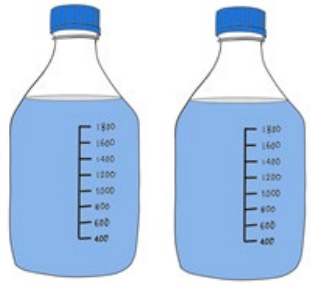




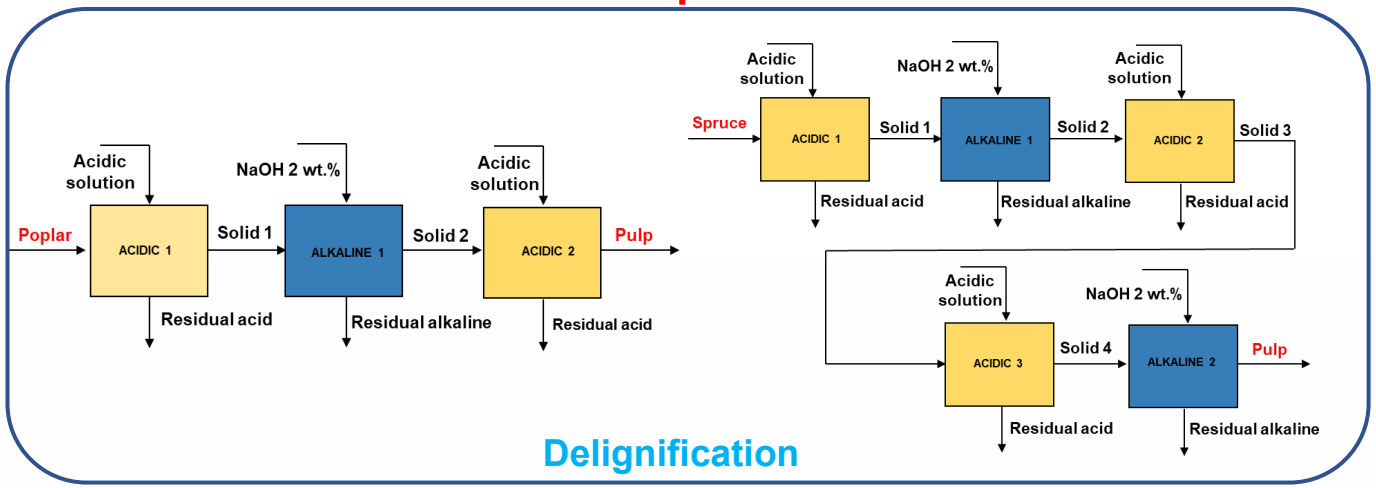
Mechanical Fibrillation



CNFs flow production

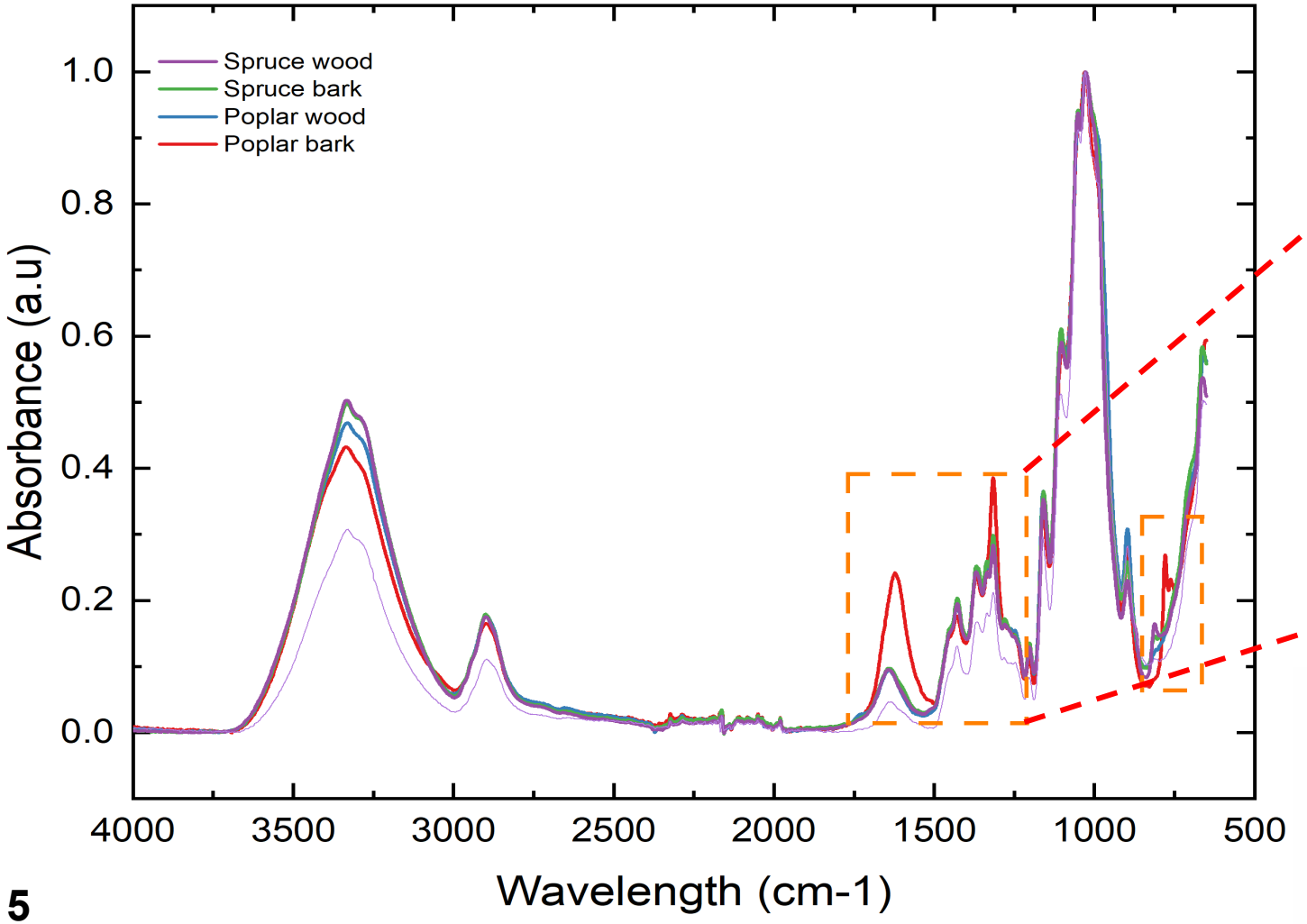


CNFs

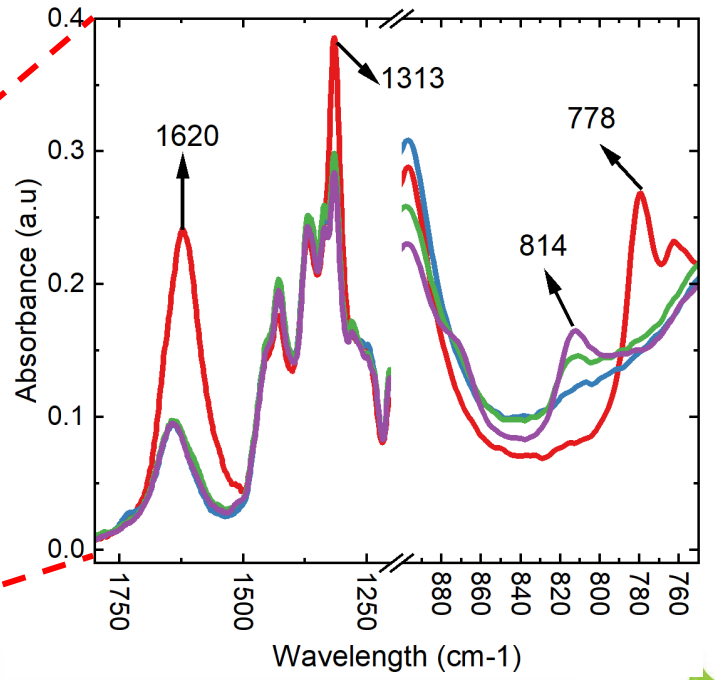


Delignification

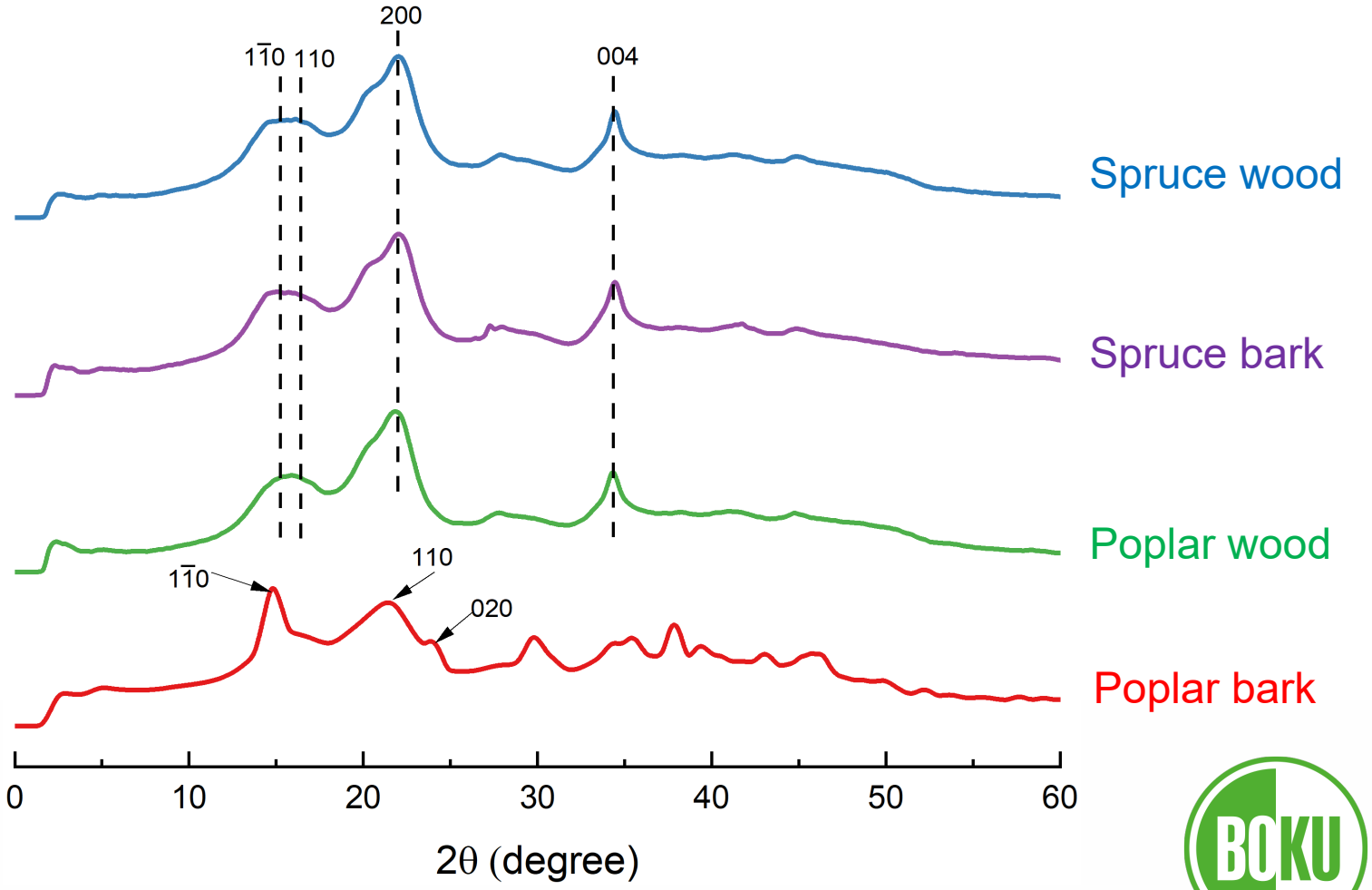
FTIR Spectra of CNFs material

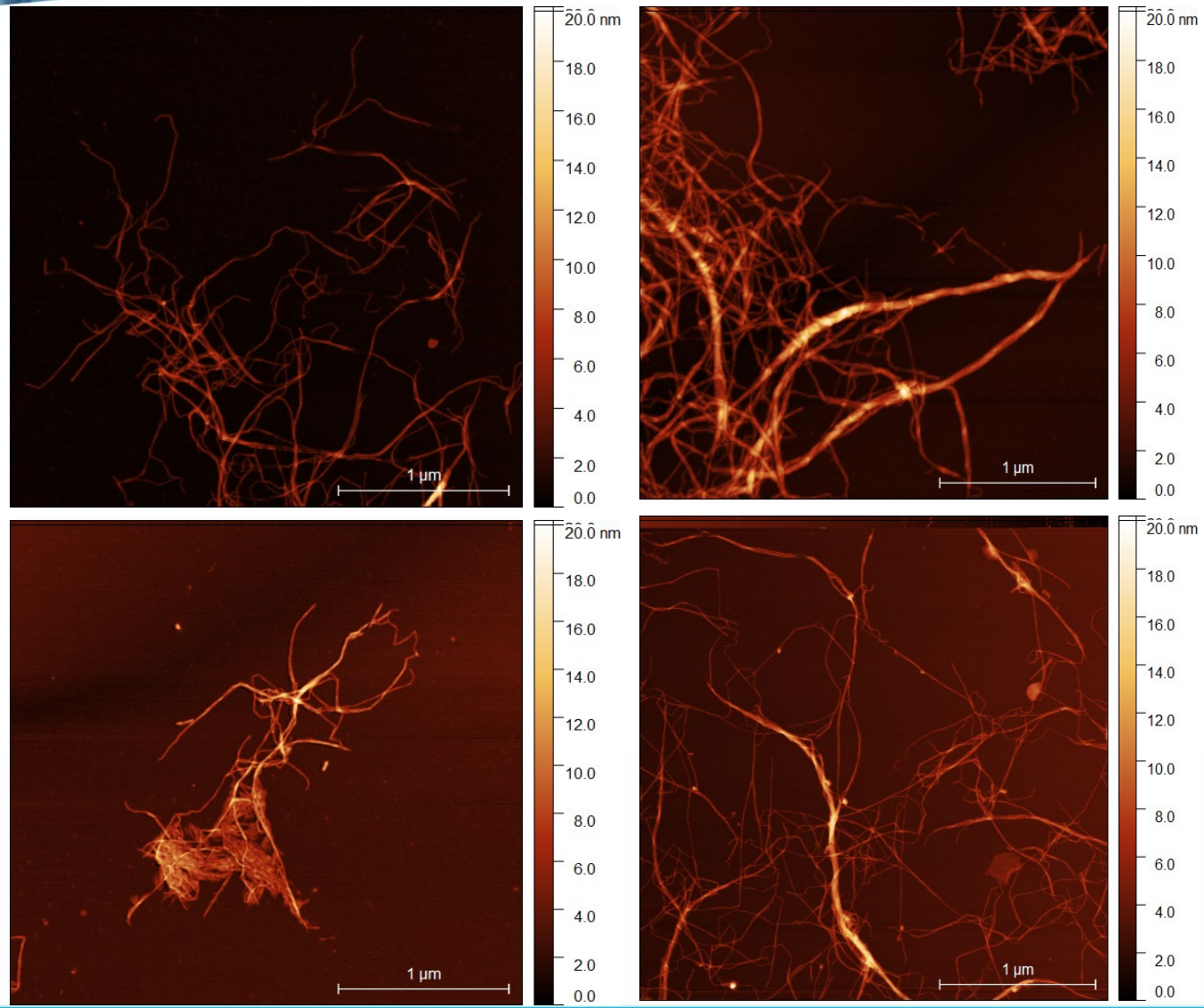


Detected Impurities

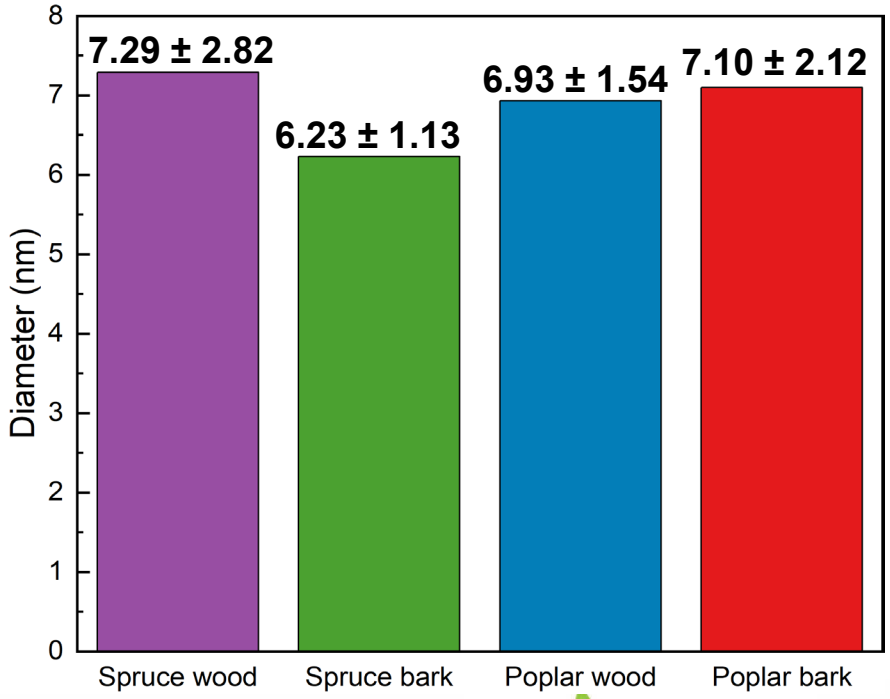


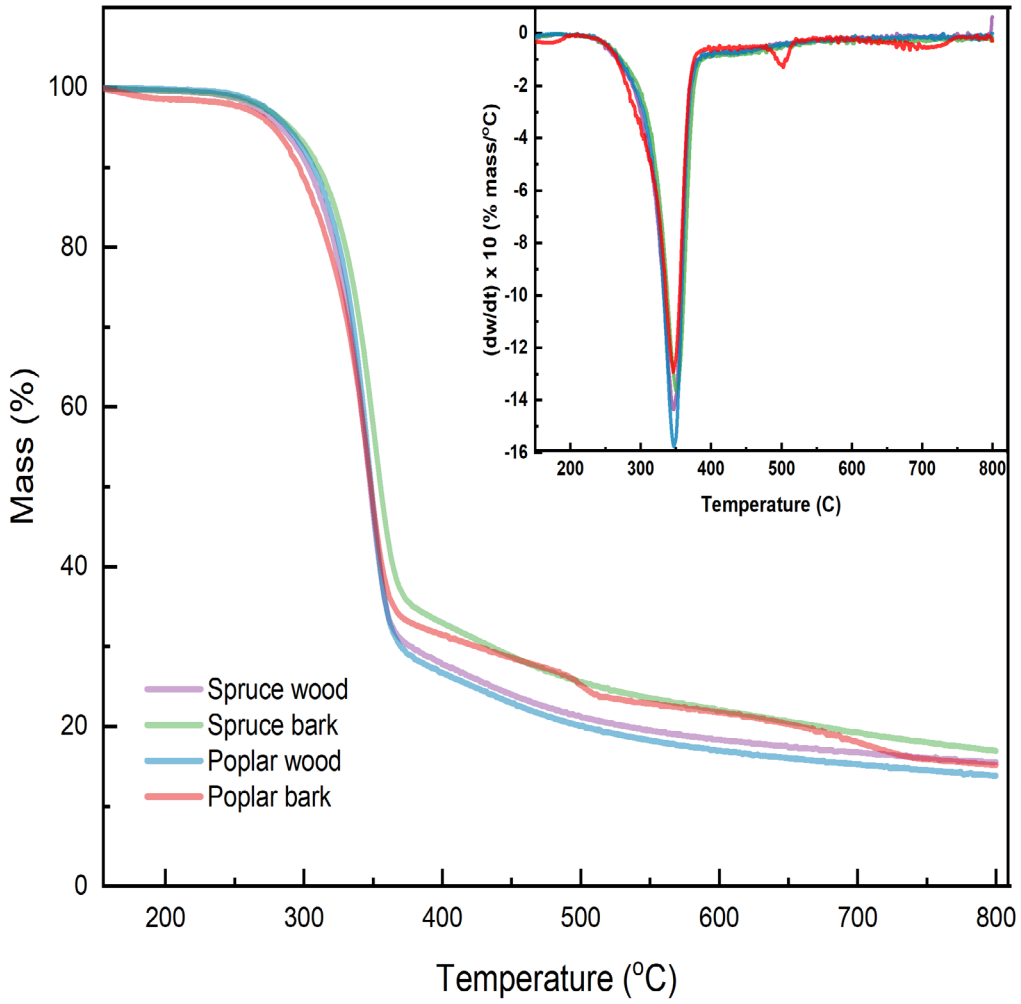
Diffractogram of CNFs material





Fibrils Diameter

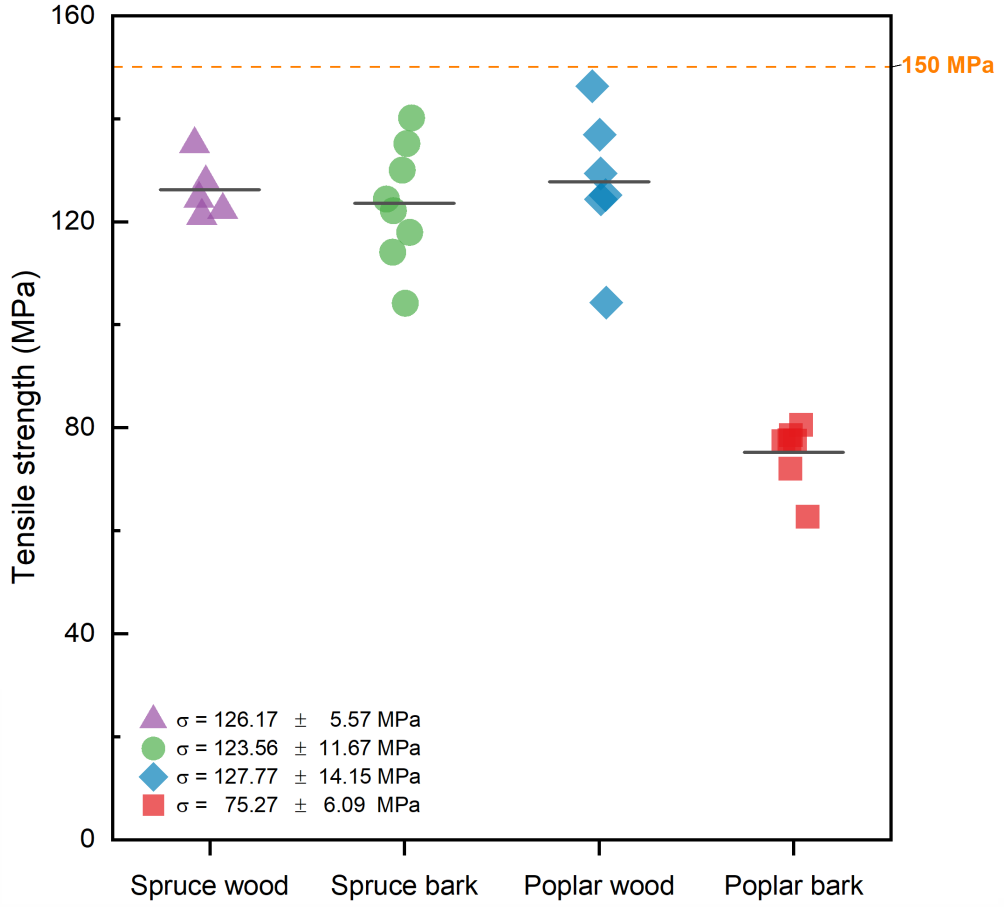


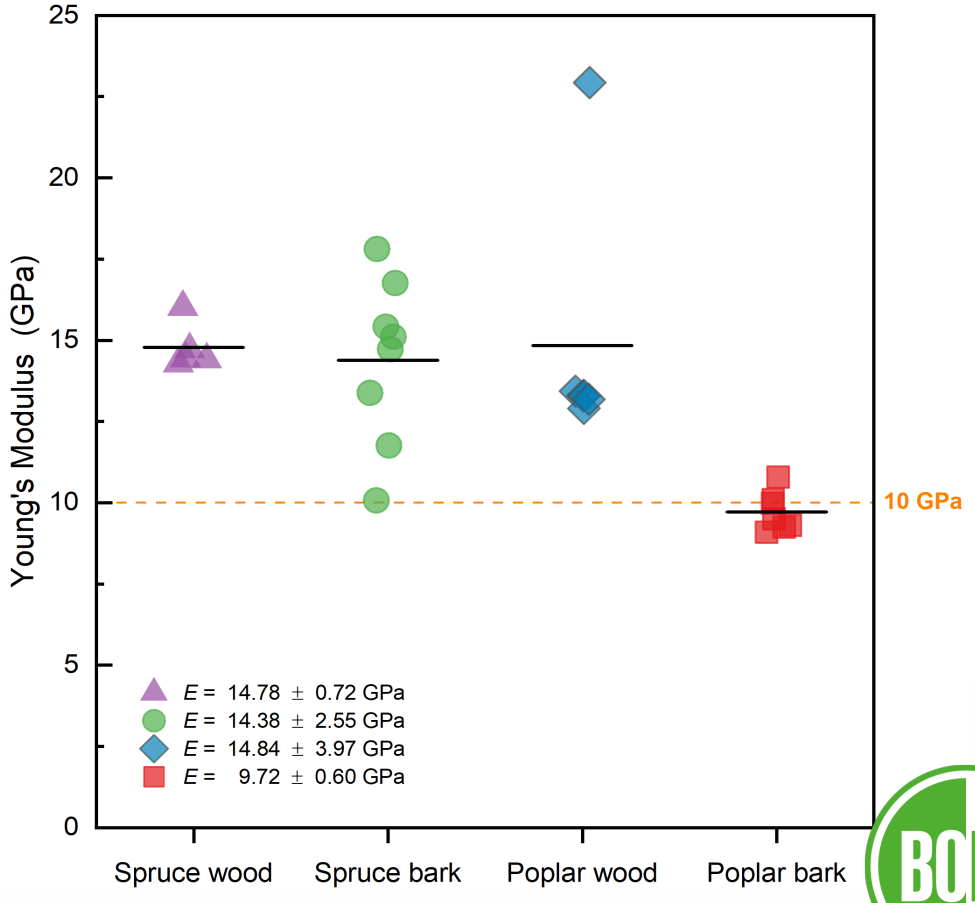


Thermal Properties

Material	T_{onset} (°C)	$T_{5\%}$ (°C)	T_{max} (°C)	Residual (%)
Spruce wood	302.8	283.4	346	15.6
Spruce bark	310.4	289.5	349	17.0
Poplar wood	306.8	287.8	347	13.9
Poplar bark	296.5	277.8	346	15.2

The Strength of CNFs





Summary & conclusion

The bark can be a feasible alternative raw material for CNF manufacture because it not only offers advantages in terms of environmental sustainability and economic viability, but it also has comparable properties to wood-based CNFs.

THANK YOU

BOKU IHTNR Institute of Wood Technology and Renewable Materials

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TAPPI NANO DIVISION