Steam Explosion of Wood

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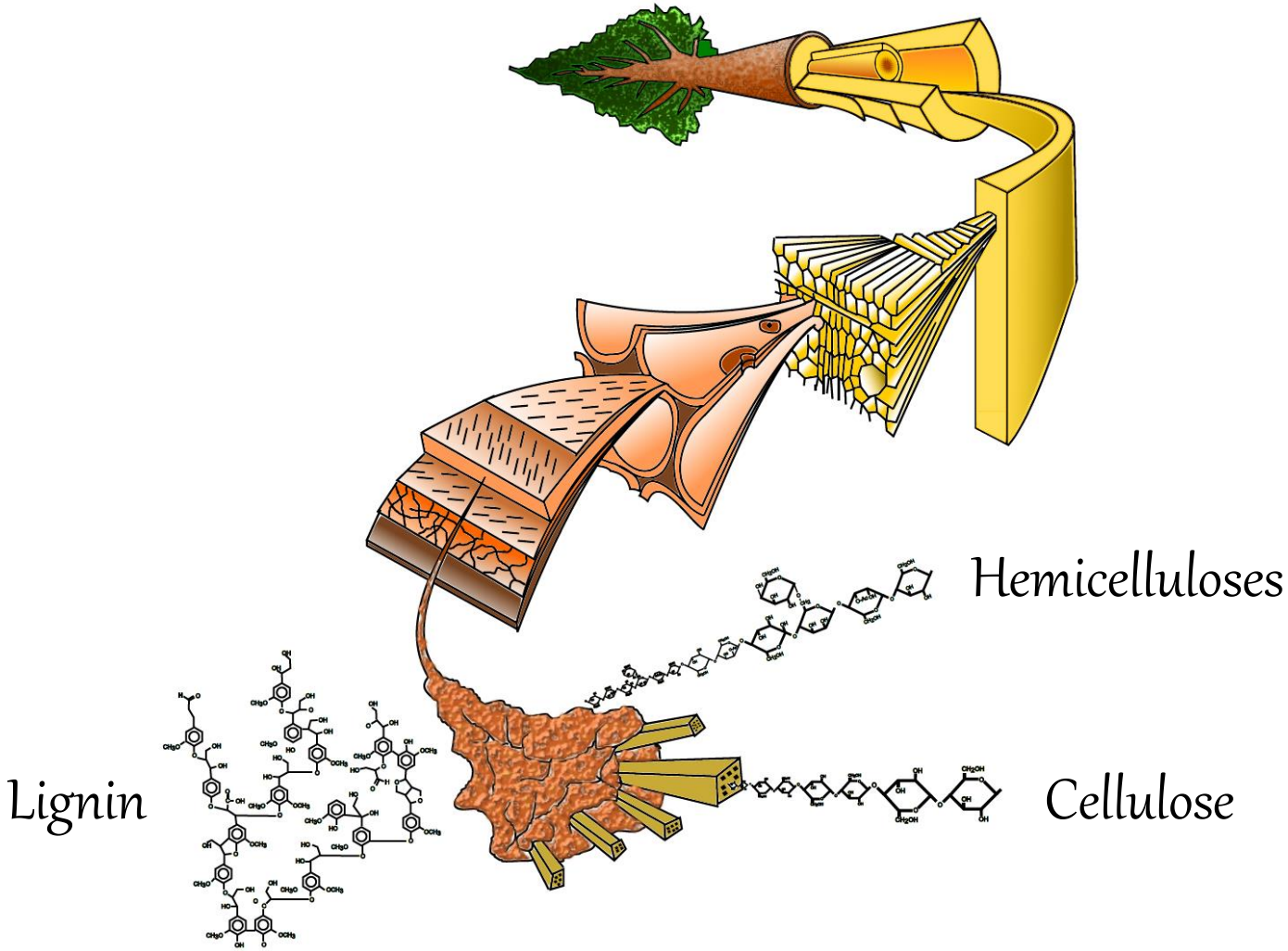
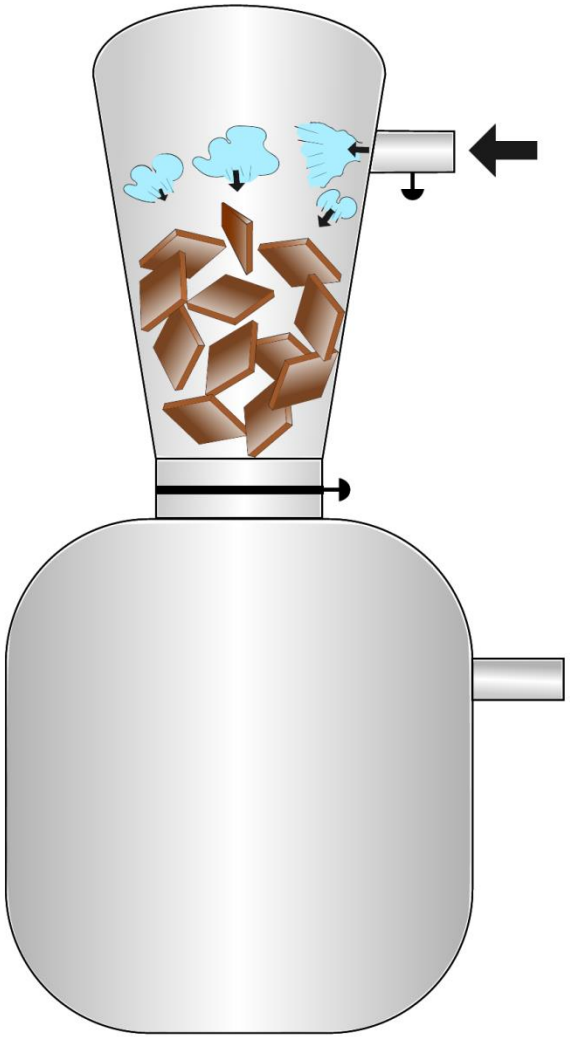
Structure of Wood Material



Steam Explosion of Wood

Three step process

i. Treatment of wood with pressurized steam for a certain time



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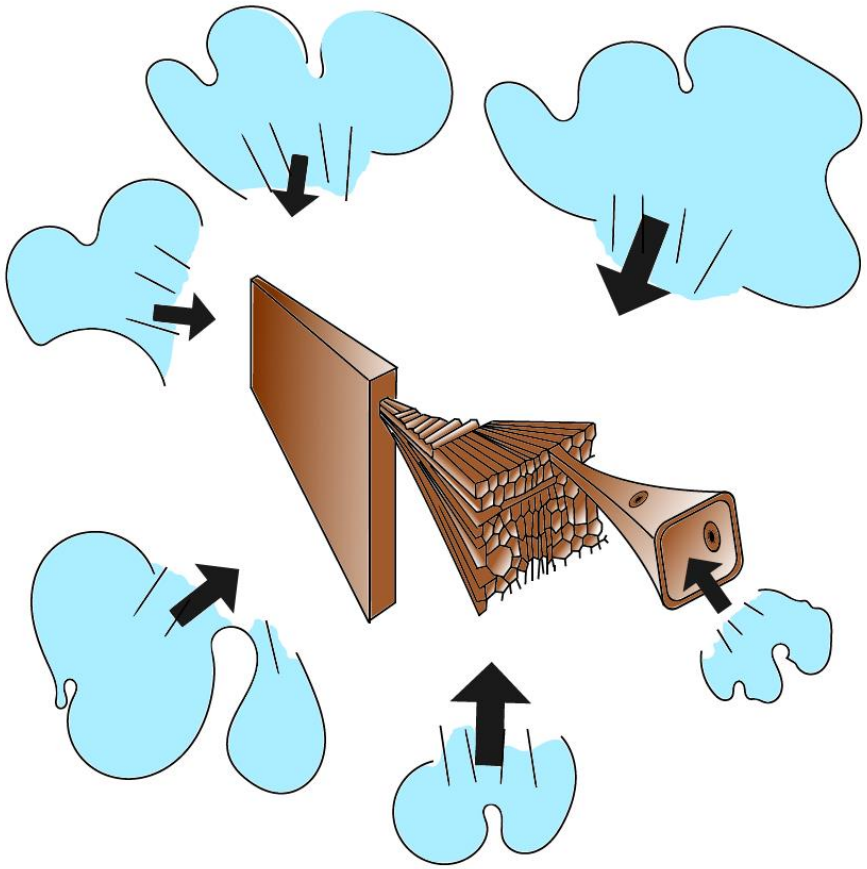
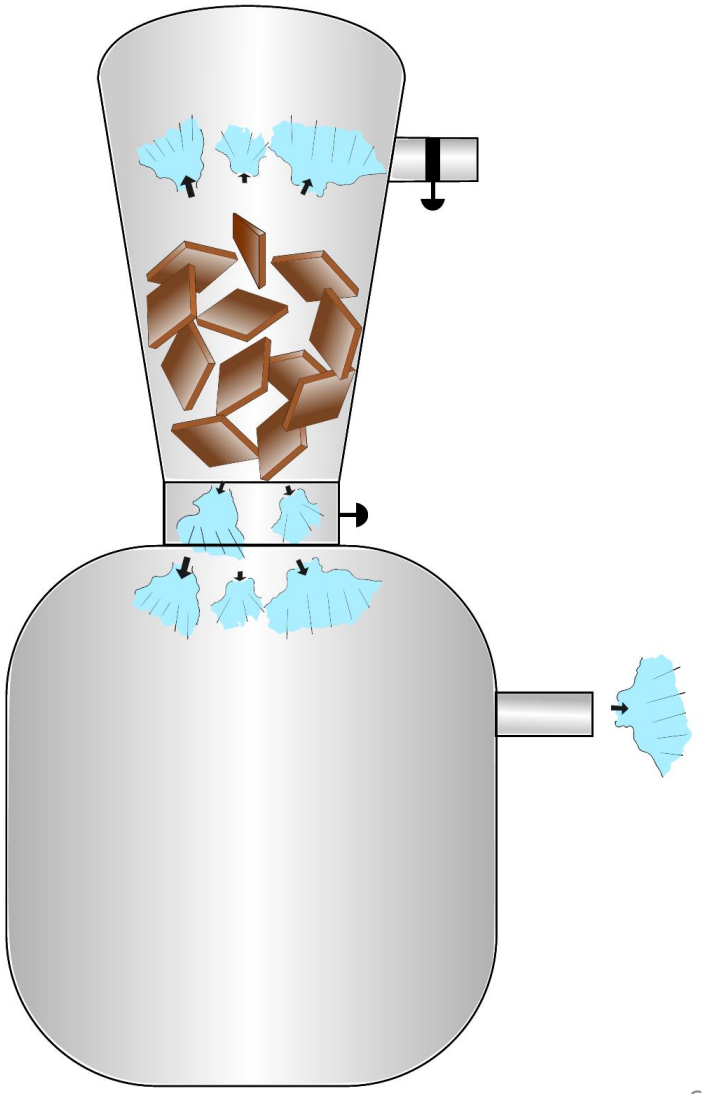


Steam Explosion of Wood

Three step process

i. Treatment of wood with pressurized steam for a certain time

ii. Explosion of wood chips by rapid release of pressure



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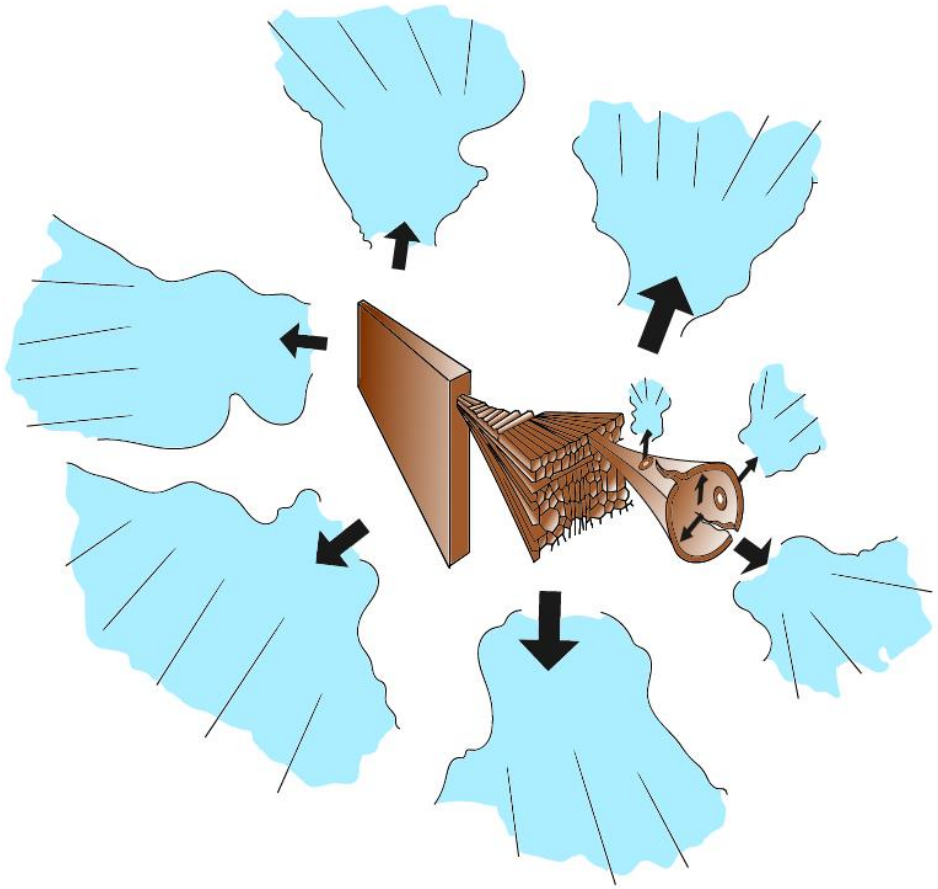


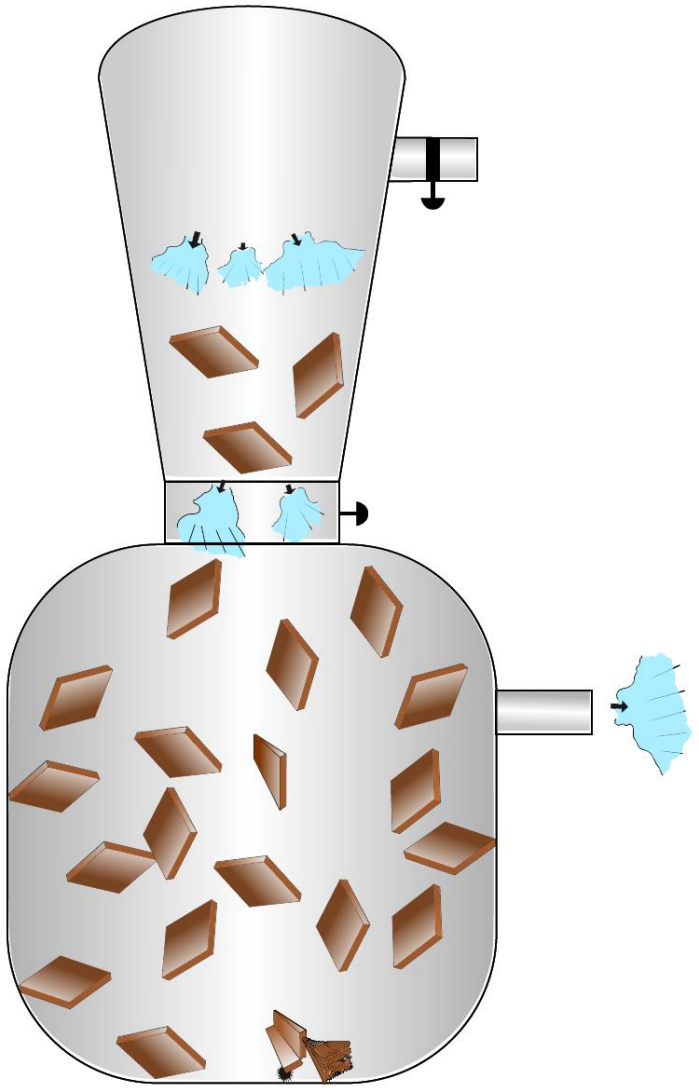
Steam Explosion of Wood

Three step process

i. Treatment of wood with pressurized steam for a certain time

ii. Explosion of wood chips by rapid release of pressure

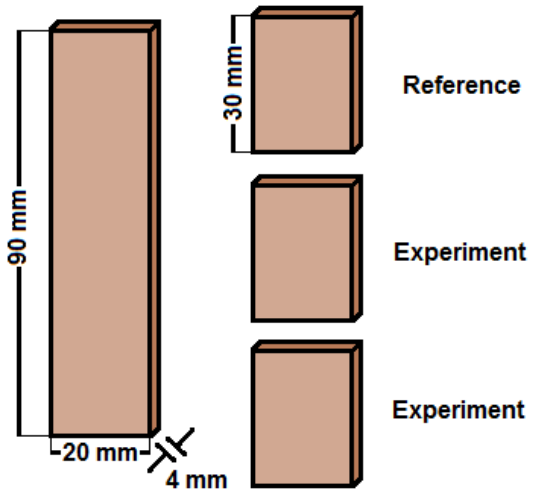
iii. Impact of softened wood chips with other chips and vessel walls.

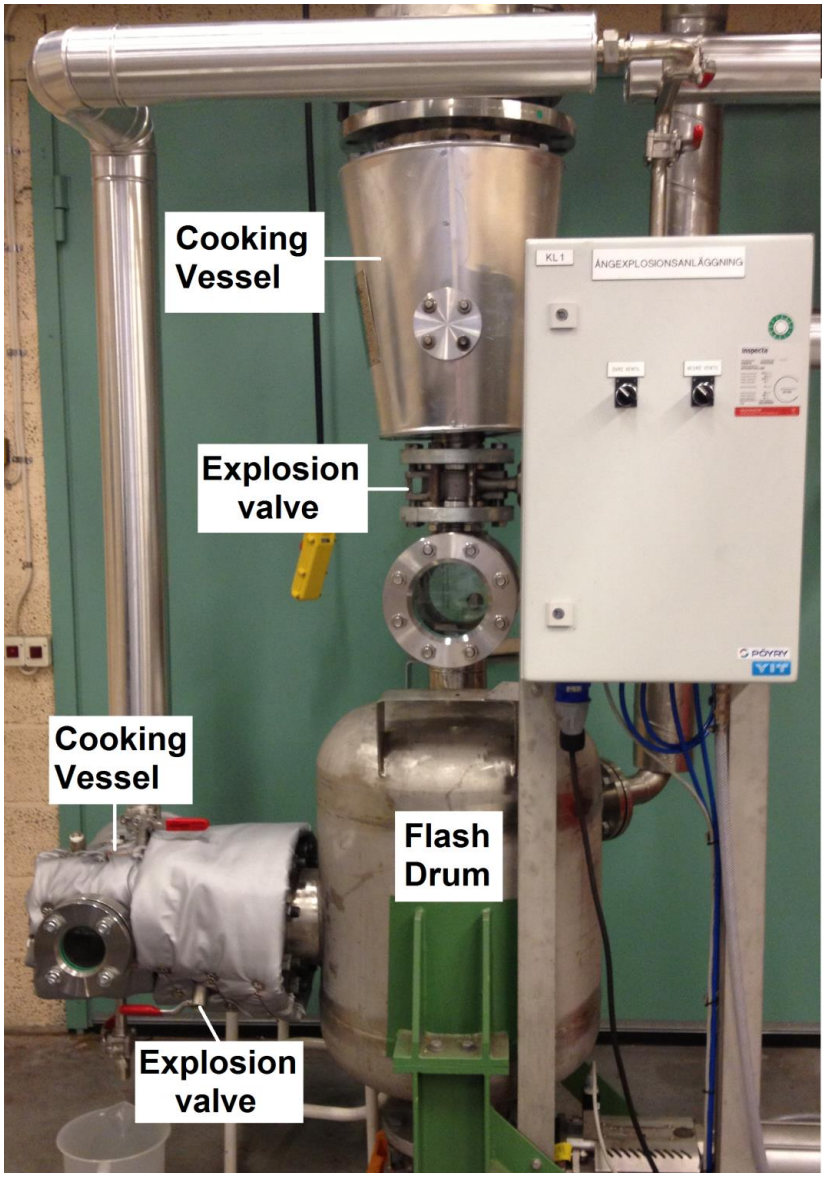


Study the structural changes that take place in wood during and after the Steam Explosion process through experiments and modelling.

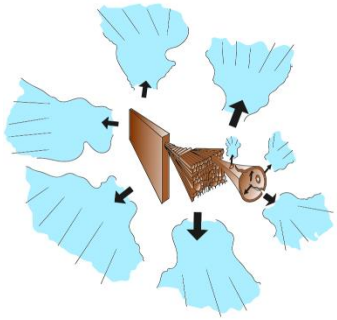
Equipment

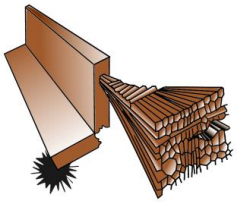
Spruce wood

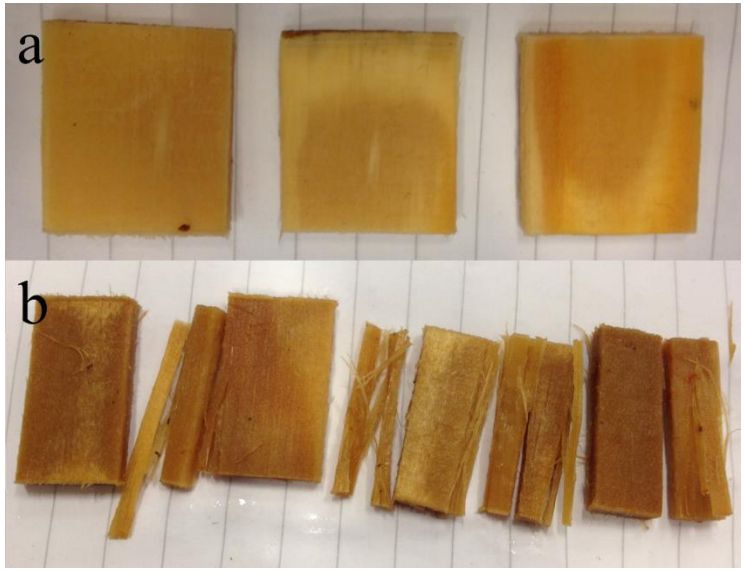




Effect of Explosion and Impact





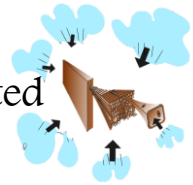


Steam exploded wood after (a) explosion (b) impact

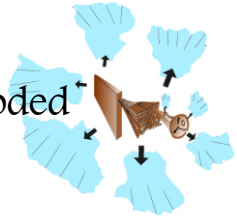
Internal structure of wood by X-ray tomography

Untreated wood

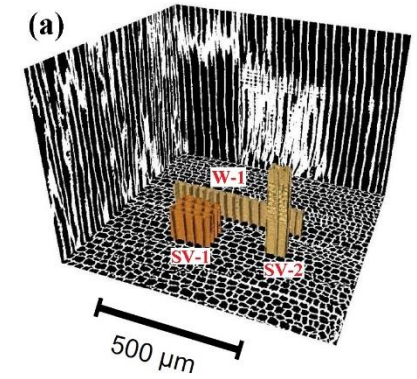
Steam treated wood

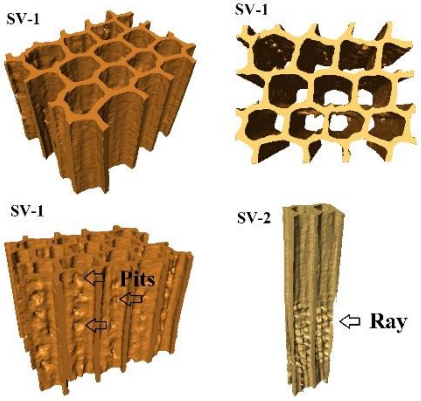


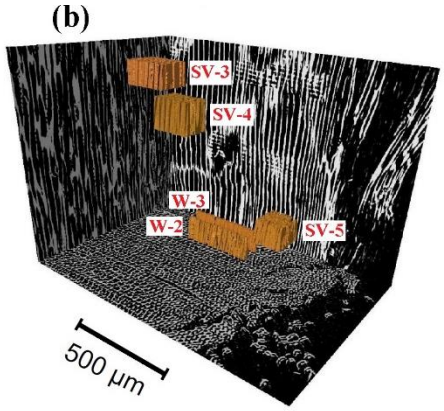
Steam exploded wood

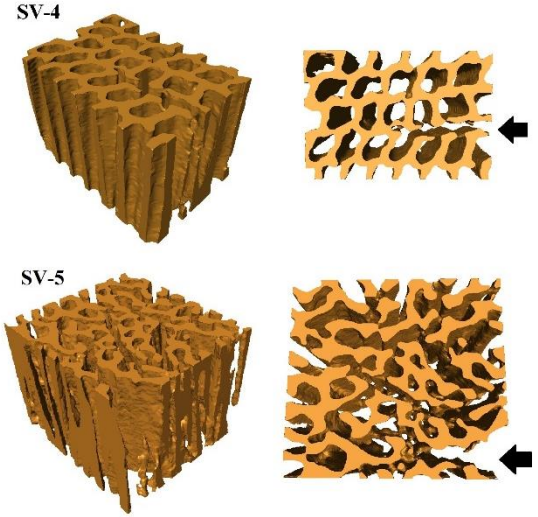


Steam exploded and impacted wood



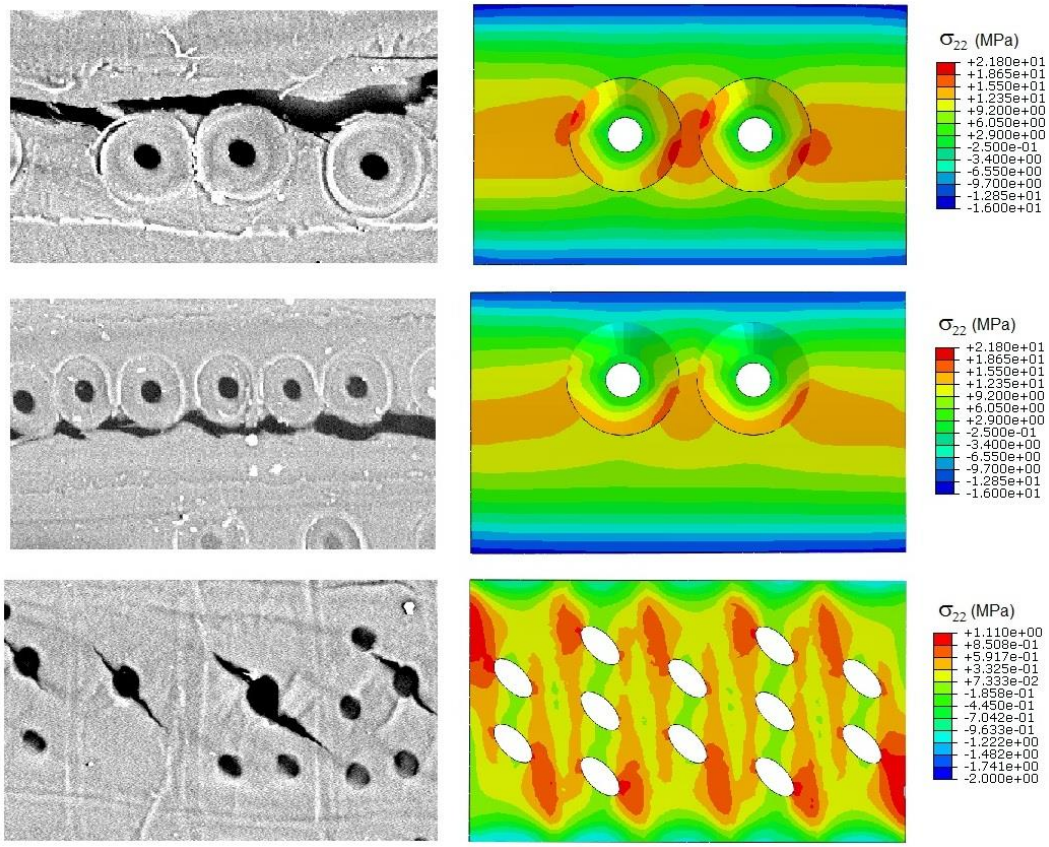


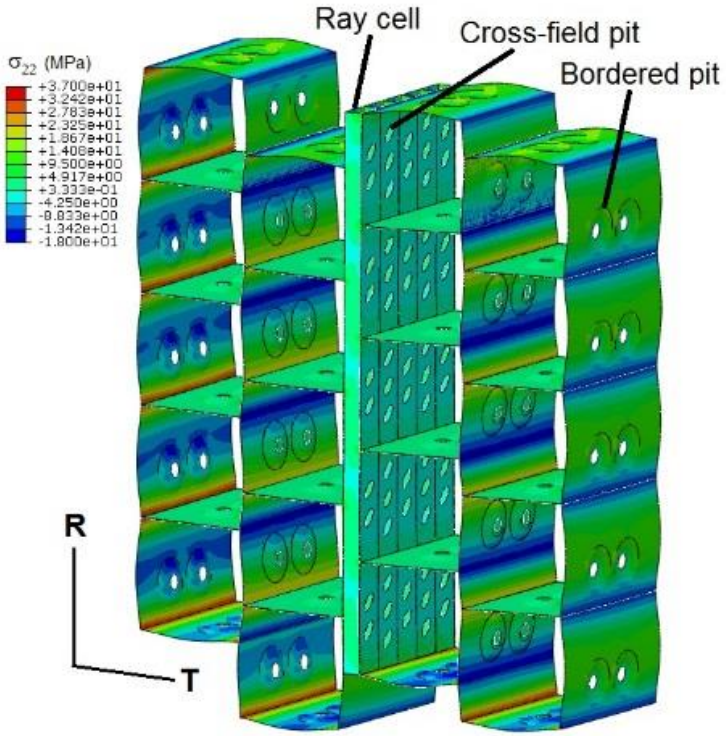




Internal structure of wood by SEM

Finite element model




Ray cell
Cross-field pit
Bordered pit
σ_{22} (MPa)
+3.700e+01
+3.242e+01
+2.783e+01
+2.325e+01
+1.867e+01
+1.408e+01
+9.500e+00
+4.917e+00
+3.333e-01
-4.250e+00
-8.833e+00
-1.342e+01
-1.800e+01
R
T