Powder X-Ray Diffraction (XRD)

For the structural analysis of cellulose, after mechanical, structural (density and microfibril angle measurements) and chemical (FTIR) characterization, LT cuts and the mechanically tested samples taken from LT cuts were mixed and powdered for each biological replicate (n=12, Table 1), then measured by powder XRD (BRUKER D8 Advance) with a wavelength of 1.5406 Å (Cu Kα radiation source) at 40 mA (40 kV) in locked coupled mode. Because fine grinding of the powder was impossible and the amount was limited, instead of the flat holders, a single crystalline Si was used as support. Cellulose crystallinity index was determined by a multiple peak fit using six Gaussian peaks (Figure S6): 0, 1: (110) Bragg peaks, 2: amorphous contribution, 3: (200) peak, 4-6: higher order Bragg peaks. Hereby the following constraints were defined. The position of the peaks was kept in reasonable range of the typical 2Θ angles of the cellulose Bragg peaks including peak 2 for amorphous contribution. The width of the (110) and (200) peaks was set equal and the height of the two (110) peaks was set equal. The crystallite size was determined by the Scherrer-equation using the FWHM of the (200) Bragg peak of the same fit.