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Deformation process of wood cellular structure during swelling and shrinkage

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Wood is a cellular biological material with strong coupling in mechanical and moisture behavior. Imaged with synchrotron radiation phase contrast X-ray tomographic microscopy, hysteretic reversible swelling/shrinkage due to ad/desorption of water vapor displays a non-affine component, particularly in low-density earlywood. Local cellular deformation of restrained swelling is documented. These measurements are used to validate poromechanical modeling of swelling at the cellular scale.

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