

# The elastic modulus of spruce wood cell wall material measured by an in situ bending technique

## Source

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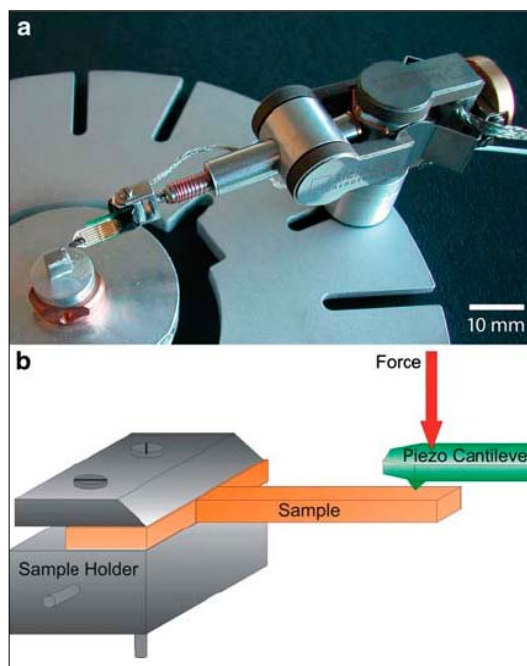
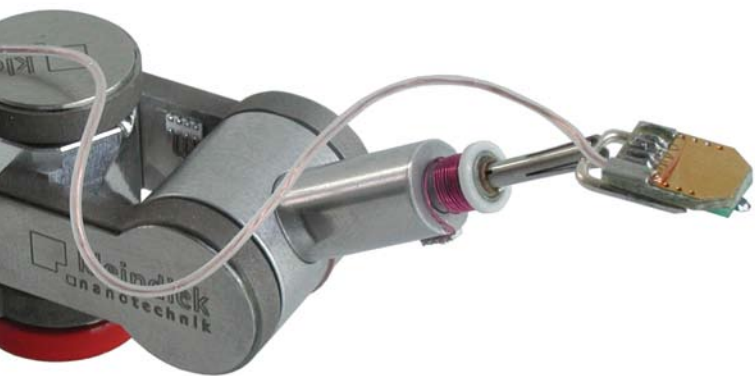
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## Abstract

Using a novel in situ testing technique, the elastic modulus of wood cell wall material can be determined with great accuracy. The method relies on a focussed ion beam system (FIB) to prepare samples from individual structural components at a length scale which otherwise is hardly, if at all, accessible for testing.



Extract: Fig. 2 (a) The testing device. (b) Schematic of the bending test method.

Once cut, the cantilever is tested by applying a known force with a piezoresistive AFM tip that is mounted on a micromanipulator. The resulting displacement is determined from SEM micrographs taken during the test. The cross-sectional area of the cantilever is determined for a number of positions along its length using the FIB as a cutting tool. Applying this method, we measured the elastic modulus of spruce wood cell wall material to be  $\sim 28$  GPa.

## Further information

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To determine the elastic modulus of cell wall material, cantilevers are cut with the FIB from wood cells for beam bending experiments inside the FIB or a scanning electron microscope (SEM). This type of sample preparation is site-specific and, at the same time, minimises the usual sample mounting problems.