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Mechanical measurements on plant virus derived tubes

Initiative: Komplexe Materialien (beendet)

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The infection mechanism of some viruses is characterized by generation of specific channels (viral movement proteins - called viral tubes) from cell to cell in order to transport genetic information. These tubes present an interesting biological tubular nanomaterial and could be a potential candidate as a mechanically stable component for realizing signal transfer in micro- or nano-bioelectronic devices or for integration in Bio-MEMS. Excellent mechanical properties comparable with spider silk are expected. Aim of this project is the characterization of the mechanical and electrophysiological properties of viral tubes. The purification of the viral tubes will be achieved either by preparation of native (virus-infected plants) or recombinant (transgenic plants) tubes. Growth experiments with the aim of directed growing by providing guiding structures and electrophysiological characterization during the growth will be made in micro-electrode-arrays. Specifically adapted testing devices are used for determining tensile and bending forces in microscopic dimensions. Numerical simulations using different modeling approaches accompany the experimental investigation of structure - property - relations in order to understand the (bio-molecular-) mechanics of the tubes.

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