

Abstract Submitted
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Radial Elasticity of Nanotubes ISMAEL PALACI, STEPHAN FEDRIGO, HARALD BRUNE, Swiss Federal Institute of Technology (EPFL), Institute of the Physics of Nanostructures, Lausanne, Switzerland, CHRISTIAN KLINKE, IBM Watson Research Center, Nanoscale Science Department, New York, USA, ELISA RIEDO, Georgia Institute of Technology, School of Physics, Atlanta, USA — The last decade has led to the discovery of many nanostructures like nanotubes, nanowires or nanobelts. Industrial applications of these nanostructures need practical tools to characterize their optical, electrical or mechanical properties. Here we propose to use state of the art atomic force microscopy to characterize the radial elasticity of nanotubes of different diameters. The nanostructures were elastically strained in the radial direction by applying small indentation amplitudes. In the case of multiwalled carbon nanotubes, this method enables to extract the radial Young modulus from compliance measurements. We find 600 GPa for our smallest tubes with a radius $R = 2.2$ nm. The values strongly decrease with increasing radii until they reach an asymptotic value of 30 ± 10 GPa at $R \geq 4$ nm. The normal force vs. indentation curves are in qualitative agreement with molecular dynamics simulations.

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