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Title:	Time-resolved nano-Newton force spectroscopy in air and vacuum using a load cell of ultra micro-balance
Authors:	Panda, Biswajit (/jspui/browse?type=author&value=Panda%2C+Biswajit) Sidhu, M.S. (/jspui/browse?type=author&value=Sidhu%2C+M.S.) Munjal, P. (/jspui/browse?type=author&value=Munjal%2C+P.) Sokhi, Shivali (/jspui/browse?type=author&value=Sokhi%2C+Shivali) Singh, K.P. (/jspui/browse?type=author&value=Singh%2C+K.P.)
Keywords:	Nanomechanical Validate stability Biomaterials
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Abstract:	We demonstrate a simple and versatile nanomechanical force measuring setup with 1 nN precision in air and vacuum using a load cell of an ultra-microbalance. We validate stability, precision, and linearity of the load cell with simple tests. The setup is customized to measure stress-strain response of biomaterials (silk, leaf, and flower) and capillary force in fluids. We isolated an optical pull force induced by a Watt-level laser reflected from a mirror/solid surface in air, in addition to optical push force. Furthermore, we add an interferometric probe to directly measure nanoscale deflection of cantilever of the load cell in real-time, thus bypassing its conventional electromagnetic readout, to improve speed and precision of the instrument. We demonstrate nanomechanical force measurement in high vacuum with the same precision and employ radiation pressure to calibrate the load cell for various precision measurements.
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