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In-situ testing of templated carbon nanotubes using an integrated MEMS testing stage SHAONING LU, DMITRIY DIKIN, JAEHYUN CHUNG, RODNEY S. RUOFF¹, Northwestern University — We present in-situ mechanics studies of nanostructures inside an SEM conducted using a MEMS testing system; it has a stage based on a deep reactive ion-etched high aspect ratio MEMS device with integrated actuator and force sensing structures. The device provides nanoscale displacement and force resolution for tensile testing. Novel approaches have been developed for mounting and clamping nanostructures onto the stage. A new approach, with combined use of electric field and a special drying method, has been developed to mount templated carbon nanotubes (T-CNTs) present in a liquid dispersion onto the device without chemical or mechanical damage. This method also can control the location and number of deposited T-CNTs. Tensile testing has been done on the T-CNTs and the device provides sufficient force to break them. The deformation of the T-CNTs has also been imaged during loading. We appreciate the support from the Naval Research Laboratory (grant No. N00173-04-2-C003), the ONR (grant No. N000140210870) and the NSF (CMS-0304506). This work was performed in part at the Cornell Nano-Scale Science & Technology Facility which is supported by the NSF under Grant ECS-9731293, its users, Cornell University and Industrial Affiliates.

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