

Abstract Submitted
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High Aspect Ratio Carbon Nanotube MEMS NICK MORRILL, DAVID HUTCHISON, ROBERT DAVIS, RICHARD VANFLEET, Brigham Young University — A new approach to the fabrication of microelectronic mechanical devices (MEMS) is a bottom-up design using carbon nanotubes (CNTs). A substrate, typically silicon, is prepared for MEMS construction by first depositing a sacrificial layer of SiO_2 for release. Then a 30nm layer of Al_2O_3 is deposited as a diffusion barrier for the CNT catalyst material (Fe). Next, using photolithography, resist is patterned and developed. A thin layer (4nm) of Fe is deposited on top of the resist and in the trenches where the resist was removed during development. Finally, “lift-off,” or removal of the remaining resist, leaves the surface with Fe patterned where CNTs are to be grown. CNTs are grown to various heights, providing high aspect ratios and well-defined features. The CNT “forests” can then be filled with various materials, of which we have tested and operated silicon and silicon nitride devices. To release MEMS devices for operation, the substrate is immersed in HF, removing part of the SiO_2 layer below. The new composite’s properties were analyzed and compared to MEMS devices fabricated using conventional methods.

Nick Morrill
Brigham Young University

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