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Strength and Mechanical Properties of Carbon Nanotube Templated Materials TAYLOR WOOD, ROBERT DAVIS, RICHARD VANFLEET, JUN SONG, Brigham Young University — The type of material a structure is made of limits its kinds and extent of practical applications. Carbon nanotubes have an unusually high strength-to-weight ratio and thus present an exciting material for use in reinforcing the structural integrity of microstructures. However, despite their desirable properties, carbon nanotubes have proved difficult to incorporate in materials as strengthening elements. Our group has developed a method for patterning and infiltrating, or filling, carbon nanotube forests to make structures. This filling of the space between the carbon nanotubes locks the structure together. Carbon infiltration proceeds by flowing an ethylene/argon mixture across a sample at a temperature of 900 C, thus depositing amorphous carbon and creating a carbon/nanotube composite material. Using cantilever structures, we have begun to measure key mechanical properties of this composite material. We are able to determine the maximum applied force that a carbon-infiltrated microstructure can withstand which allows us to calculate mechanical properties, such as the Young's modulus of the composite material.

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