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Low-Temperature Infiltration of Carbon Nanotubes to Improve Mechanical Robustness EVAN DODSON, NICK ALLEN, ROBERT DAVIS, Brigham Young University - Provo — Infiltrated carbon nanotubes (CNT) forests, fabricated in a chemical vapor deposition (CVD) furnace, are a good material for MEMS for their combination of relatively low density and high mechanical strength. However, for larger scale forests, the infiltration process is poor at improving the mechanical strength of CNT since the ethylene gas is diffusion limited moving through CNT forests. At high temperatures (900 °C), this causes the amorphous carbon to cap the outside of CNT forests quickly preventing deeper infiltration into the forest. At lower temperatures (∼850 °C), the overall infiltration proceeds slower making the capping process take longer which allows for better infiltration of the CNT forests. Scanning electron microscopy (SEM) images were taken of cross-sections of CNT forests infiltrated at 850 °C to determine the infiltration time required to achieve maximal infiltration. Mechanical testing of infiltrated CNT beams was conducted using 3-point bending to determine the strength and modulus of the beams.

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