Effect of Depth of Large-Sized Buried Carbon Nanotubes (CNT) Network and Interphase on the Contact Response in AFM Nanoscale Characterization

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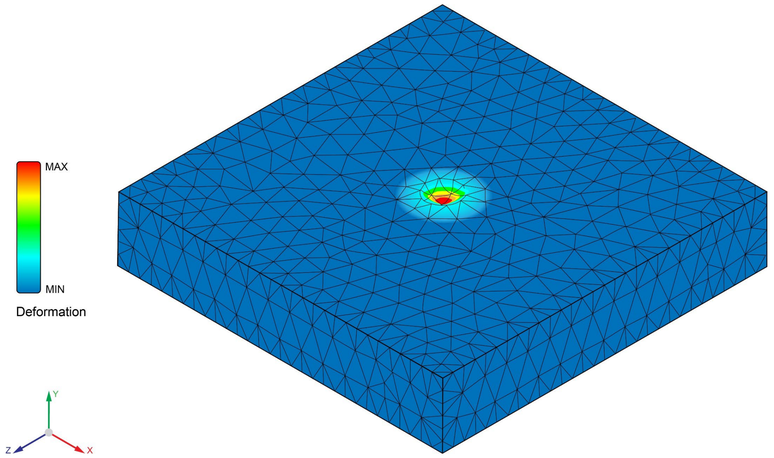
Abstract

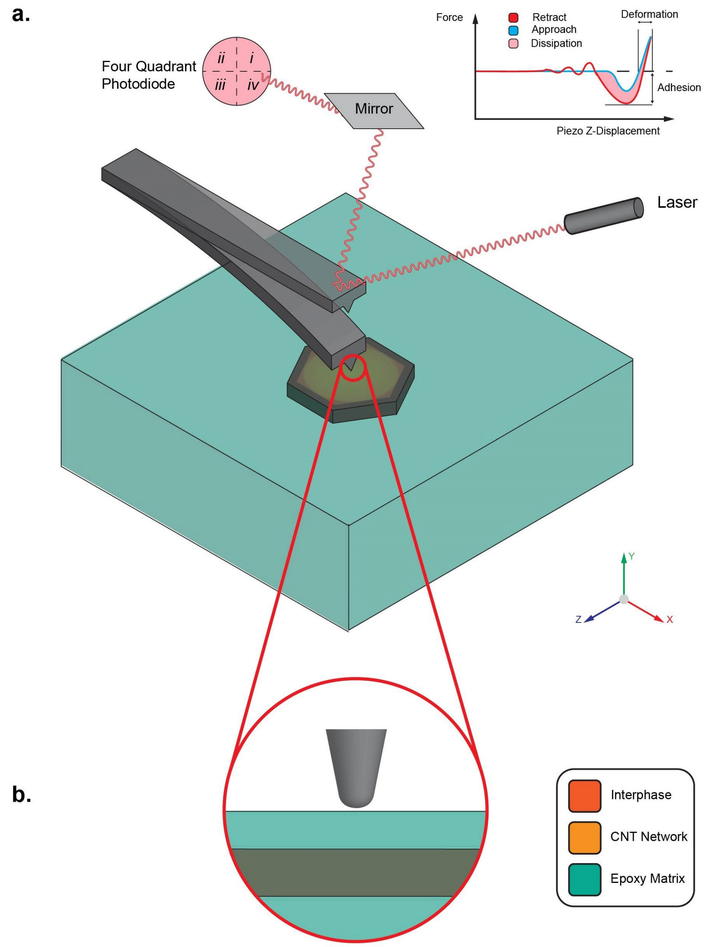
Understanding of the CNT network interphase will help in facilitating the manufacturing of stronger and tougher composites that are employed in aerospace, space, and defense sectors. Finite Element simulations are used to characterize the nanoscale effect of depth of large-sized CNT network and interphase on contact response in AFM to develop a multiscale understanding of damage tolerant nanocomposite materials

Finite Element Simulation



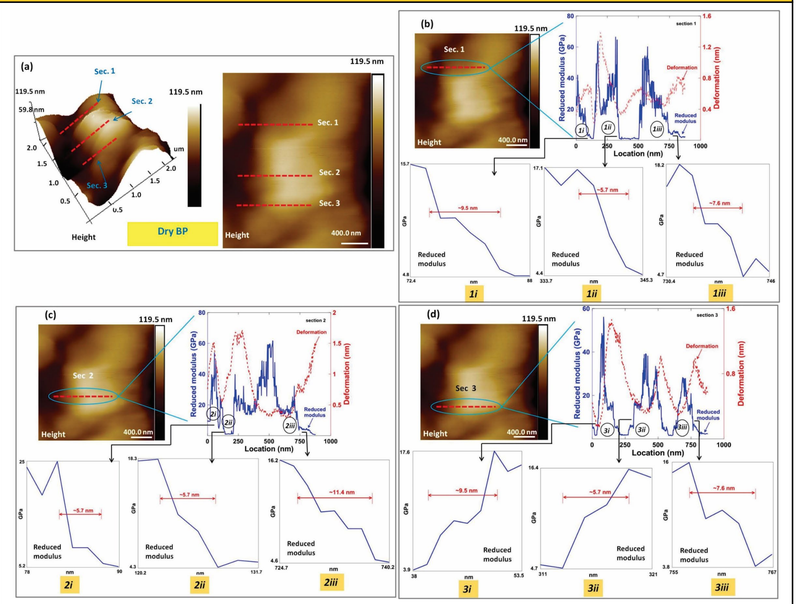
Deformation on the epoxy matrix due to AFM Probe Tip

AFM PF QNM on buried CNT network



Schematic representing AFM PF QNM on buried CNT network and interphase in epoxy matrix. A spherical tip with an effective tip radius is used for FE simulations

Reduced Modulus and Deformation of Dry Buckypaper



- Locations with high modulus have relatively small deformations
- CNT is found at locations where modulus is 15 GPa or higher

ASME IMECE Paper

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