

Chemical Force Microscopy of Single Walled Carbon Nanotubes

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Chemical Force Microscopy/Spectroscopy are important new methods for probing interactions between molecules and surfaces. We have utilized these methods to examine the affinity of substituted alkanes with the surface of single walled carbon nanotubes (SWNT). Force volume images of SWNTs were obtained using gold-coated AFM tips functionalized with terminally-substituted alkanethiols. Analysis of these images enabled quantification of the adhesive interactions between the functionalized tip and the SWNT surface. The resultant adhesive forces were shown to be dependent upon surface topography, tip shape, and the terminal group on the alkanethiol. Since the tensile modulus, strength, and strain of SWNTs are greater than steel, they are ideal components for next generation composite materials. The information presented herein will aid in the design of new, light-weight, high-strength composite systems with uniform mechanical properties.