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Transformation of carbon nanoparticles under laser microirradiation NINAD INGLE, VIJAYALAKSHMI VARADARAJAN, ALI KOYMEN, SAMARENDRA MOHANTY, UT Arlington — Functional, mechanical, electrical and thermal properties of carbon nanoparticles (CNP) have been shown to change significantly with change in its shape and structure. Here, we show that shape of the CNPs can be transformed by exposure to tightly focused near-infrared Ti: Sapphire laser beam. The CNPs were prepared using electric plasma discharge generated in an ultrasonic cavitation field of liquid benzene. High resolution TEM image showed nanoparticles with average radius of ∼5nm with crystalline structure. A Nanonics Multiview Atomic Force Microscopy (AFM) was integrated on the laser micro-irradiation system to reveal the shape transformation of the CNPs before and after laser irradiation. Since near-IR laser irradiation can lead to significant heat generation in CNP in absence of aqueous solution (sink), the system is far from thermal equilibrium and can curve or bend graphitic layers by introducing topological defects. The photothermally-induced shape transformation can occur below laser power required for complete melting of CNP since surface melting can suffice the observed shape transformation. The results show significant reduction in the volume of irradiated CNP-clusters, which was attributed coalescing of melted CNPs. Raman spectroscopic measurements are being carried out to evaluate possibility of ultrastructural changes.

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