

Site Controlled Nanotube Shell Etching for Interlayer Motion Based NEMS

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Abstract

We present a new method for local control of shell engineering in multiwalled carbon nanotubes (MWNTs) using the Joule-heating induced electric breakdown technique. By modulating the heat dissipation along a nanotube, we can confine its thinning and shell breakdown to occur within localized regions of peak temperatures. The modulation is achieved by using suitably nanomachined heat sinks with different degrees of thermal coupling at different parts of a current-carrying nanotube. Being compatible with CMOS unit processes, this method is expected to be a powerful tool to create batch fabricated nanobearings with sophisticated architectures for use in nanoelectromechanical systems (NEMS).

Keywords

Carbon nanotubes, shell engineering, NEMS, heat sink