Electronic Supplementary Information

Coaxial Carbon@Boron Nitride Nanotube Arrays with Enhanced Thermal Stability and Compressive Mechanical Properties

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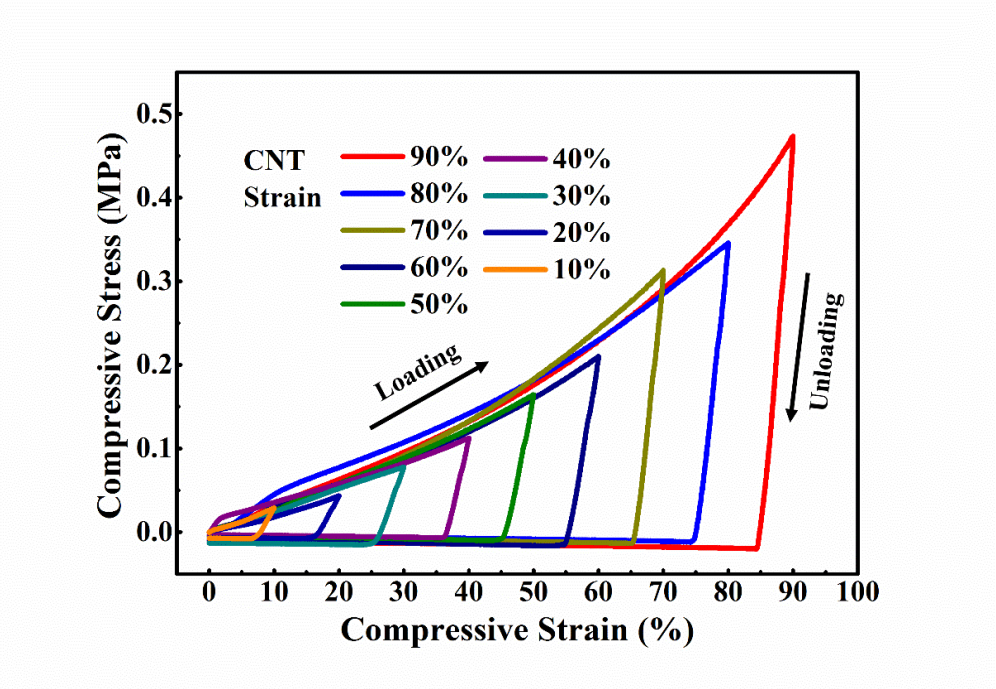

Fig. S1 Compressive stress *vs.* strain curves for the CNT arrays at strains ranging from 10% to 90%. The as-grown CNT arrays deformed almost plastically with minute recovery at all applied strains.

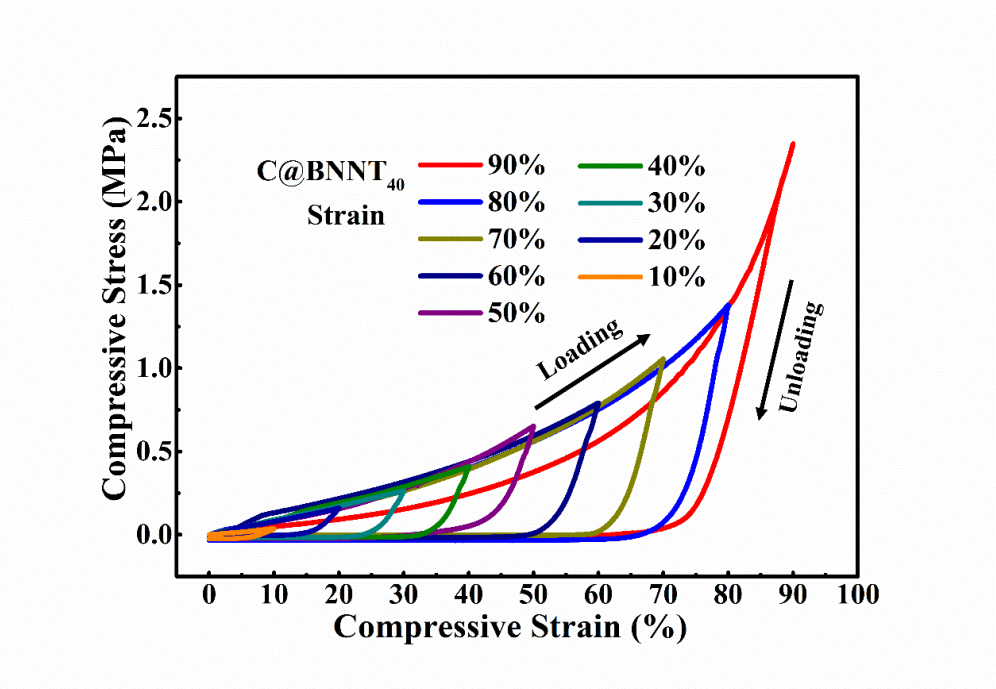

Fig. S2 Compressive stress *vs.* strain curves for the C@BNNT$_{40}$ arrays at strains ranging from 10% to 90%. The C@BNNT$_{40}$ arrays exhibited partial shape recovery at all applied strains.

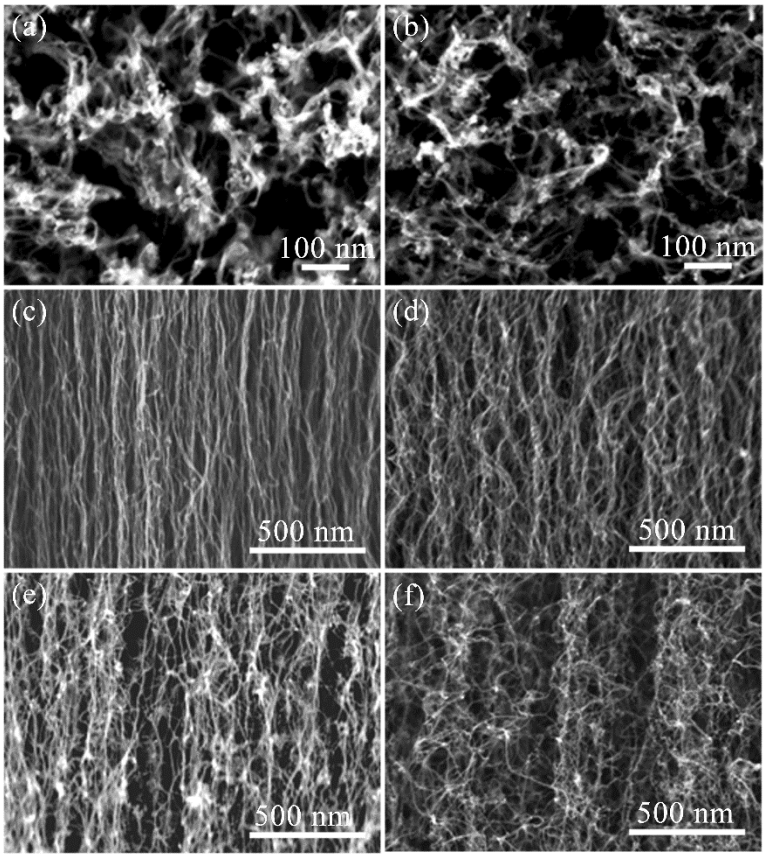

Fig. S3 SEM images of the top surface (a, b), top portion (c, d) and bottom portion (e, f) of the CNT arrays before and after annealing in air at 400 °C for 1 h. The overall areal density of the CNTs decreased due to the annealing-induced oxidation.

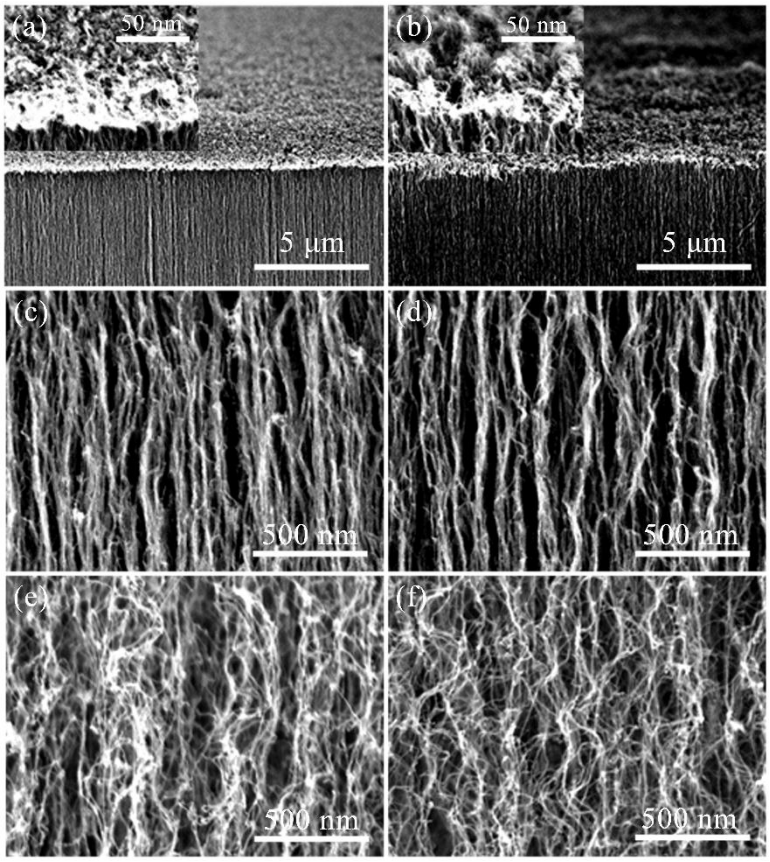

Fig. S4 SEM images of top surface (a, b), top portion (c, d) and bottom portion (e, f) of the C@BNNT$_{60}$ arrays before and after annealing in air at 400 °C for 1 h. The outer BNNTs protected most of the CNTs from oxidization.

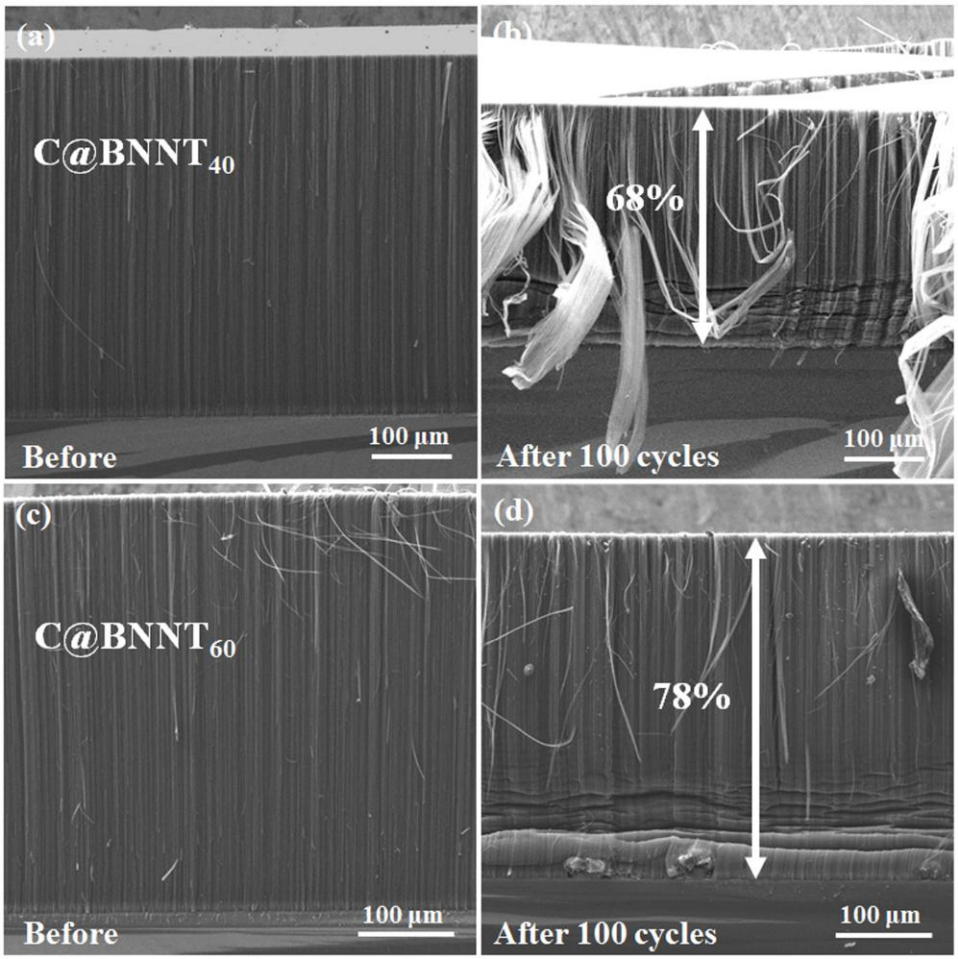

Fig. S5 SEM images of C@BNNT$_{40}$ (a, b) and C@BNNT$_{60}$ (c, d) arrays before and after 100 cycles of compression at a 50% strain, respectively.

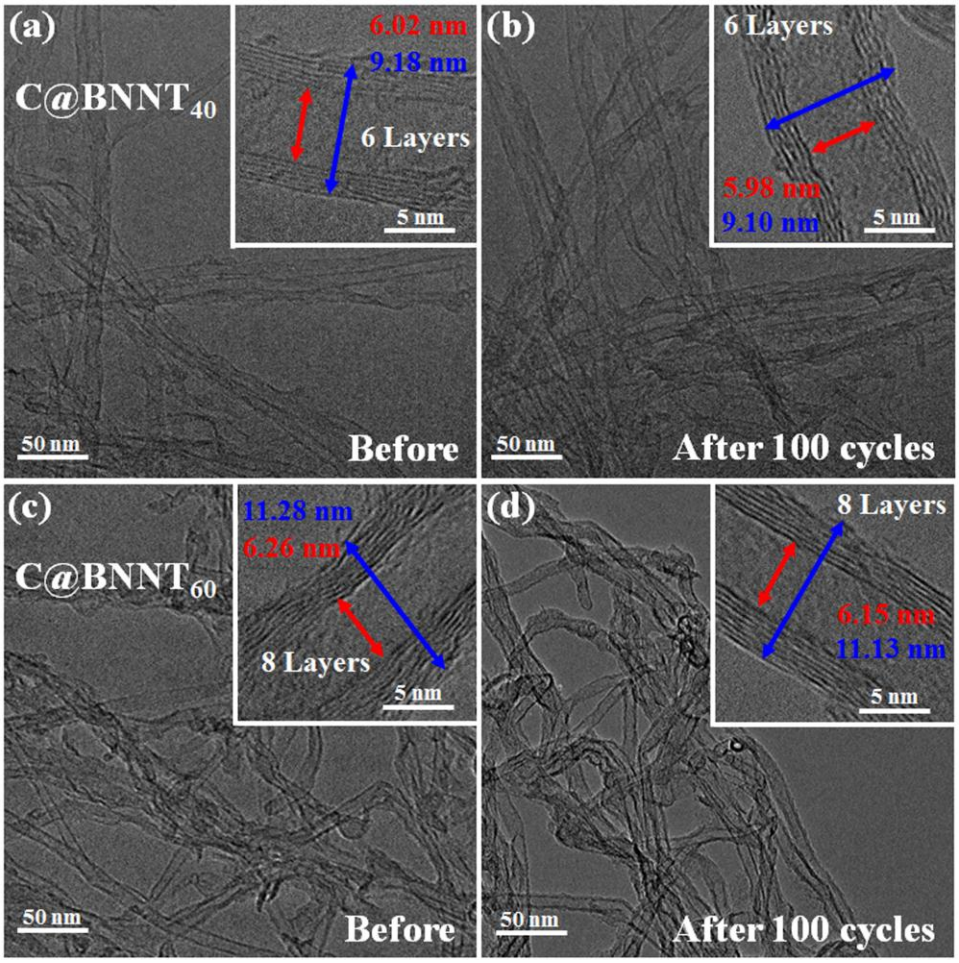

Fig. S6 Representative low and high-resolution (insets) TEM images of C@BNNT$_{40}$ (a, b) and C@BNNT$_{60}$ (c, d) before and after 100 cycles of compression at a 50% strain, respectively. No observable changes in structural dimensions (average inner, outer diameters and number of walls extracted from 10 TEM images for each) were induced to the NTs by compression, proving that the outer BNNT walls encapsulated and protected the NT arrays well throughout the long-term cyclic loading.