

### **Supplementary Manuscript S1**

It is presented a graph with the Energetic Stability values of the ON-CNTs compared to C<sub>60</sub>, Graphene and individual CNTs. We present DFT values to validate the use of the Tersoff-Brenner potential. (*S1\_Energetic\_Stability.doc*; 1018 Kb)

### **Supplementary Manuscript S2**

It is shown an example applying the mathematical relation, obtained from Euler's Law and Gauss-Bonnet theorem, for the construction of the SC (6,6) block. This relation allows to establish the amount of non hexagonal carbon rings needed for a specific block. (*S2\_EulersLaw.pdf*; 25Kb)

### **Supplementary Video S3**

An animation with the volumetric compression on the SD network is presented. It is worthy to emphasize the change in local strain around the node (change in color; red maximum, white medium, blue zero with respect to plain graphene). (*S3\_VolComp-SD.mpg*; QuickTime; 5.91 Mb)

### **Supplementary Video S4**

An animation with the unidirectional compression along the [001] axis on the SD network is presented. We should point out the length reduction achieved. (*S4\_001AxialComp-SD.mpg*; QuickTime; 10.7 Mb)

### **Supplementary Video S5**

The unidirectional compression along the [001] axis on the SC network is presented. (*S5\_001AxialComp-SC.mpg*; QuickTime; 7.01 Mb)