

## Nanoscale: Supplementary Information

### The structure of junctions between carbon nanotubes and graphene shells

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#### 1. Preparation of carbon material

The apparatus used to pass a current through graphite was a Quorum Q150T ES coater, shown in Fig.

S1.



Figure S1. Quorum Q150T ES coater used for passing current through graphite.

In this unit, the electrodes are 3 mm graphite rods, one of which is thinned to a diameter of approximately 1.4 mm and held in contact with the other electrode with a spring mechanism (see Fig. S2). The chamber is pumped by a turbomolecular pump to a pressure of approximately  $3 \times 10^{-4}$  mbar. Before carrying out the “evaporation”, the rods are out-gassed by passing a current of about 30A for 1 minute. For evaporation, a current of 75A is passed for 3 s.

Following evaporation, the thinner carbon rod is found to have slightly shortened, and a small deposit is formed in the area where the two rods make contact, as shown in Fig. S3. This is collected and prepared for TEM by grinding in an agate mortar under isopropanol, mixing in an ultrasonic bath and depositing onto lacey carbon TEM grids.

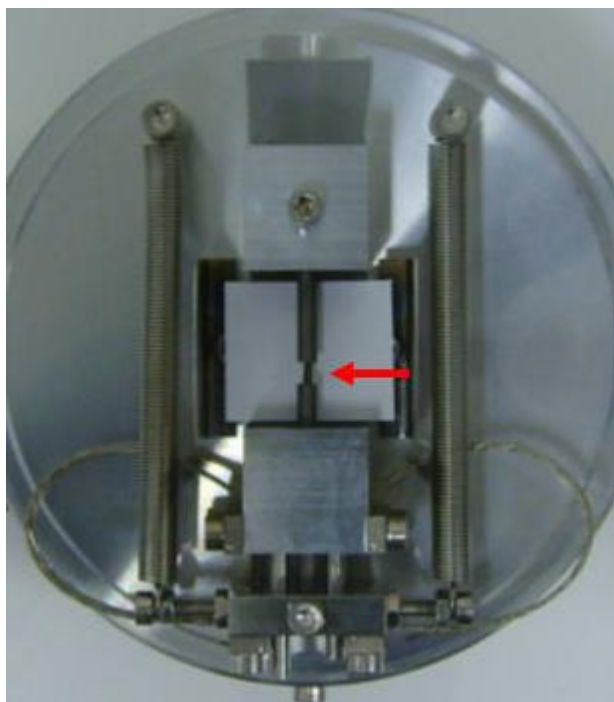


Figure S2. Electrode assembly with arrow indicating thinned graphite rod.

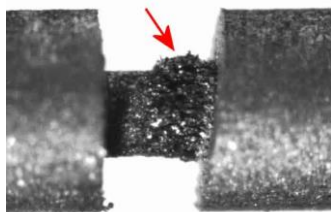


Figure S3. Deposit formed on graphite rod following passage of current

## 2. Further atomistic models of nanotube-graphene junctions

Models of  $30^\circ$  and  $60^\circ$  junctions are given below, to complement the models shown in the main paper.

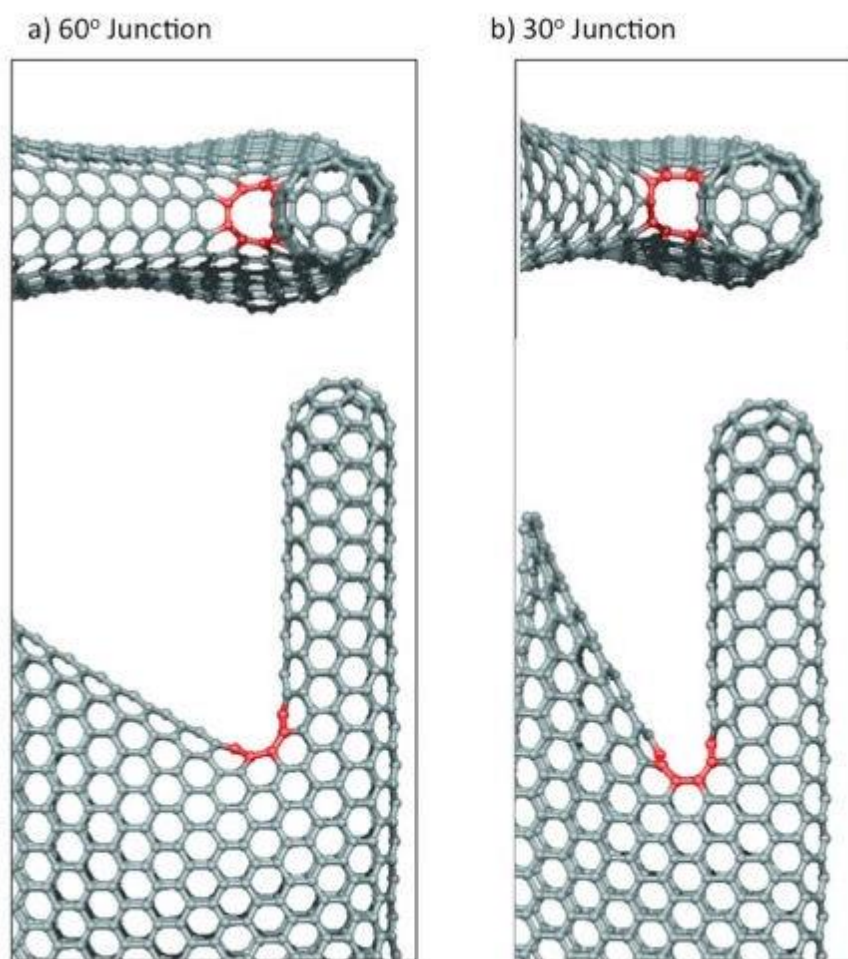


Figure S4. Atomistic models for junction of (5,5) carbon nanotube with folded graphene. (a) single decagon in a  $60^\circ$  junction, (b) single hendecagon (11-membered ring) in a  $30^\circ$  junction.