Supplementary figures for:

Fullerene growth from encapsulated graphene flakes

WAN Neng[1, #], LEI Shuang-ying[1, #], XU Jun[2], MARTINI Matteo[3], ZHOU Yi-long[1], WAN Shu[1], SUN Li-tao[1], HUANG Qing-an[1]

1. SEU-FEI Nano Pico center, Key Laboratory of MEMS of Ministry of Education, School of Electronics Science and Engineering, Southeast University, Nanjing, P. R. China, 210096

2. National Laboratory of Solid State Microstructures, School of Electronic Science and Engineering and School of Physics, Jiangsu Provincial Key Laboratory of Advanced Photonic and Electronic Materials, Nanjing University, 210093 Nanjing, China

3. Laboratoire de Physico-Chimie des Matériaux Luminescents, Université Claude Bernard Lyon 1, UMR 5620 CNRS–UCBL, 69622 Villeurbanne Cedex, France

# Authors contributed equally to this work.

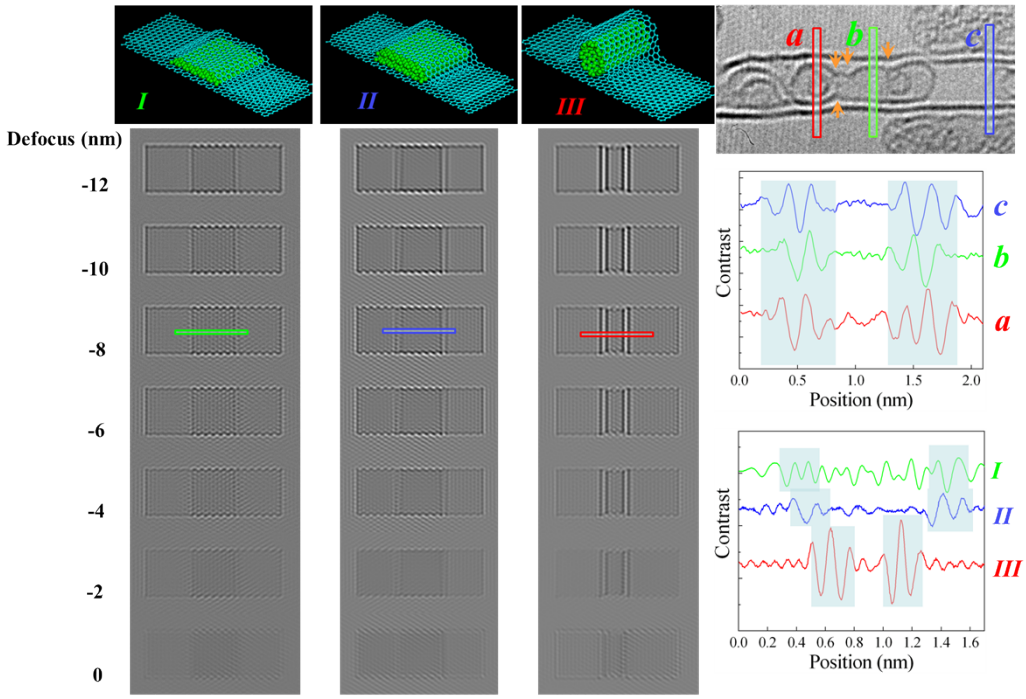

Figure s1. Analysis and determination of the carbon nanotube (CNT) structure. Left part: "I" to "III" indicate atomic model of the single layered graphene ribbon in graphene ridge, double layered graphene ribbon in graphene ridge, and a CNT in graphene ridge, respectively. Simulated TEM images at various defocus were listed below. Right part: experimental TEM images comparing with the simulated ones. Contrast profiles at three different positions indicated in the TEM image ("a" to "c") were adopted to compare with the simulated ones. One can find much better accordance of the contrast profiles of the CNT model with that of the experimental image, supporting the CNT assessment. Shaded region in the profiles denote the characteristic edge region. Orange arrows indicated in the TEM image show positions of kinks on the CNT.

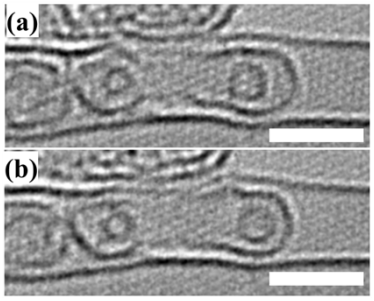

Figure s2. TEM images obtained ~ 2 hrs after the formation of the fullerene structure (Fig. 1(h)) under continuous e-beam irradiation. (a) and (b) have a time interval of about 1 second. Scale bars = 2 nm.

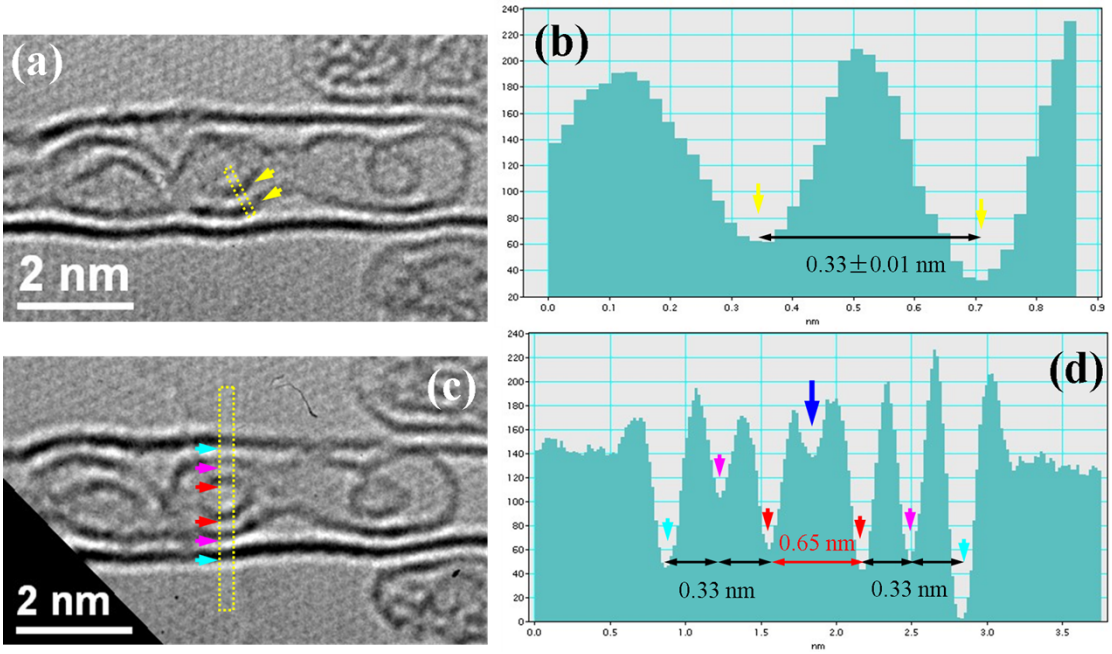

Figure s3. (a) HRTEM image at the initial stage of the fullerene growth. Line profile along the selected region (dashed yellow area) shows layer space of 0.33 nm, as indicated in (b). Yellow arrows indicate the position of layers. (c) HRTEM image after the formation of the fullerene structure. Line profile at the selected region (dashed yellow area) shows layer spaces of 0.33 nm, as indicated in (d). Note that a contrast dip was seen at the center of the fullerene structure, which is similar to the contrast distribution in the simulated HRTEM images.

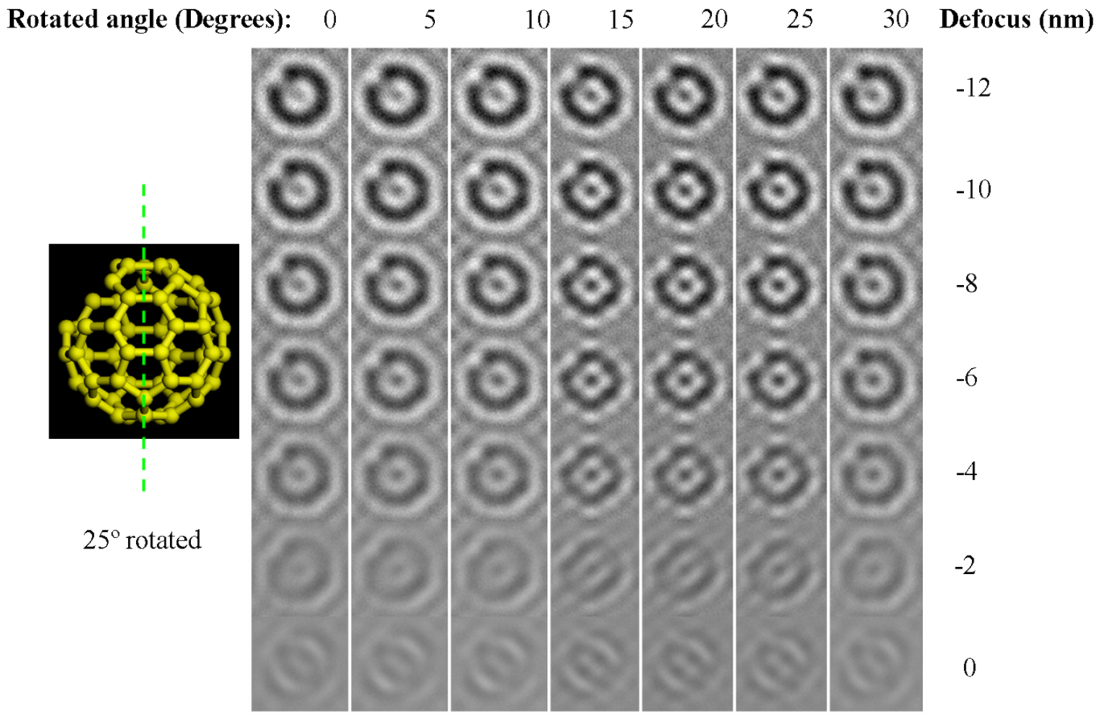

Figure s4. Simulated TEM images of fullerene structures with different rotation angle under different defocus values. The atomic structure shows a fullerene structure with a defect. Dashed green line indicates the projected plane (perpendicular to the paper surface) along which the fullerene was rotated.

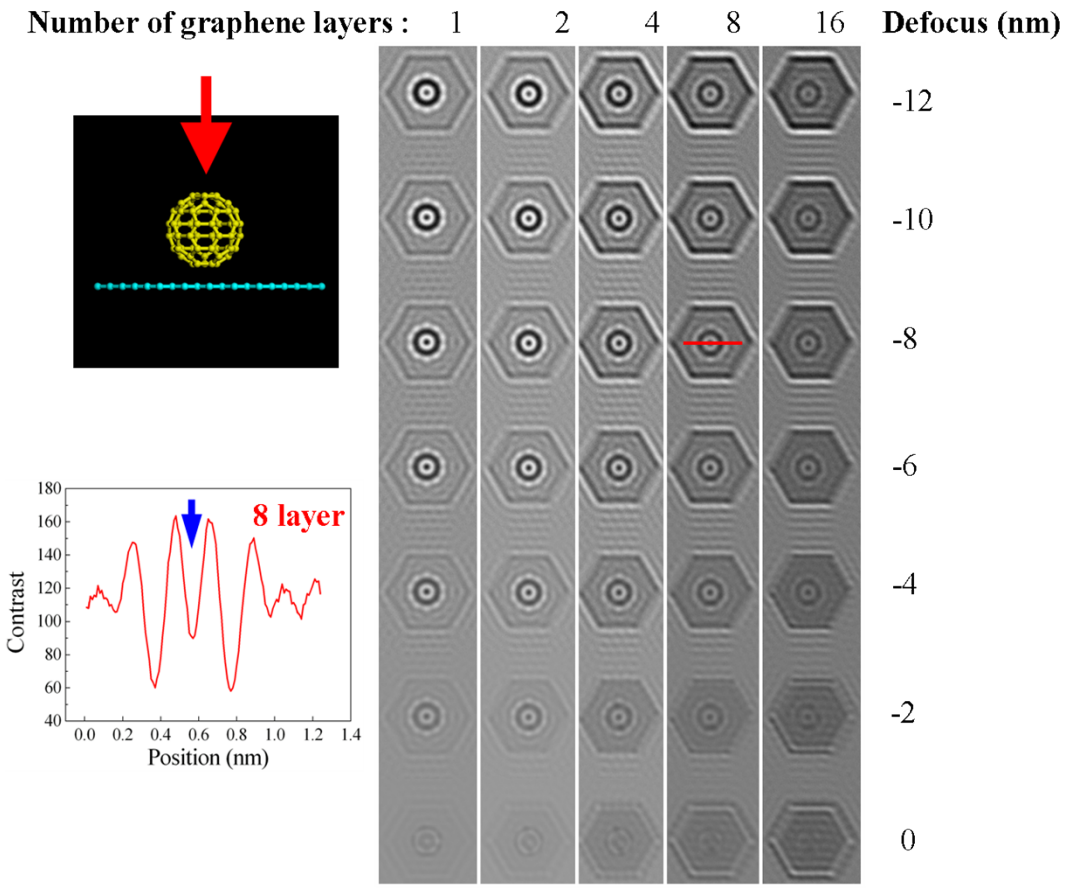

Figure s5. Simulated TEM images of fullerene on graphene structures (hexagonal shaped) with different layers under different defocus value. Atomic model shows the side view of the fullerene structure on a single layer graphene. Red arrow indicates the e-beam projection direction. A contrast profile was shown on the left side, which corresponds to the position indicated by red line at defocus = -8 nm. A blue arrow notes the contrast dip at the fullerene center.