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Supporting Information

For *Journal of Materials Chemistry*

Low-Temperature Remote Plasma-Enhanced Atomic Layer Deposition of Graphene and Characterization of Its Atomic-Level Structure

*Yijun Zhang, Wei Ren *, Zhuangde Jiang, Shuming Yang, Weixuan Jing, Peng Shi, and Xiaoqing Wu, and Zuo-Guang Ye**

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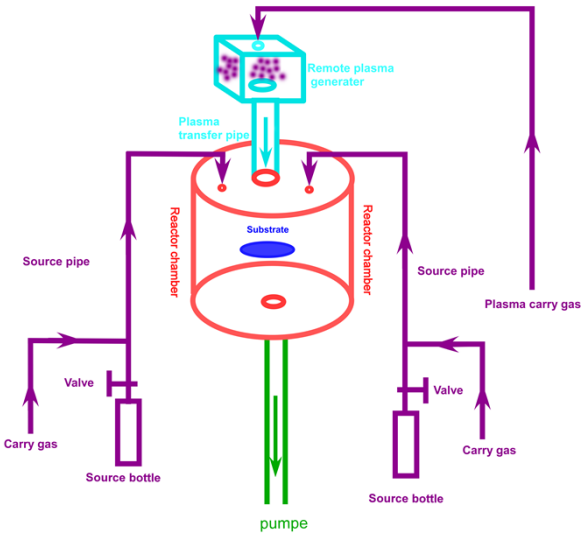

Figure S1. Schematic of the remote Plasma Enhanced Atomic Layer Deposition (PEALD) system.

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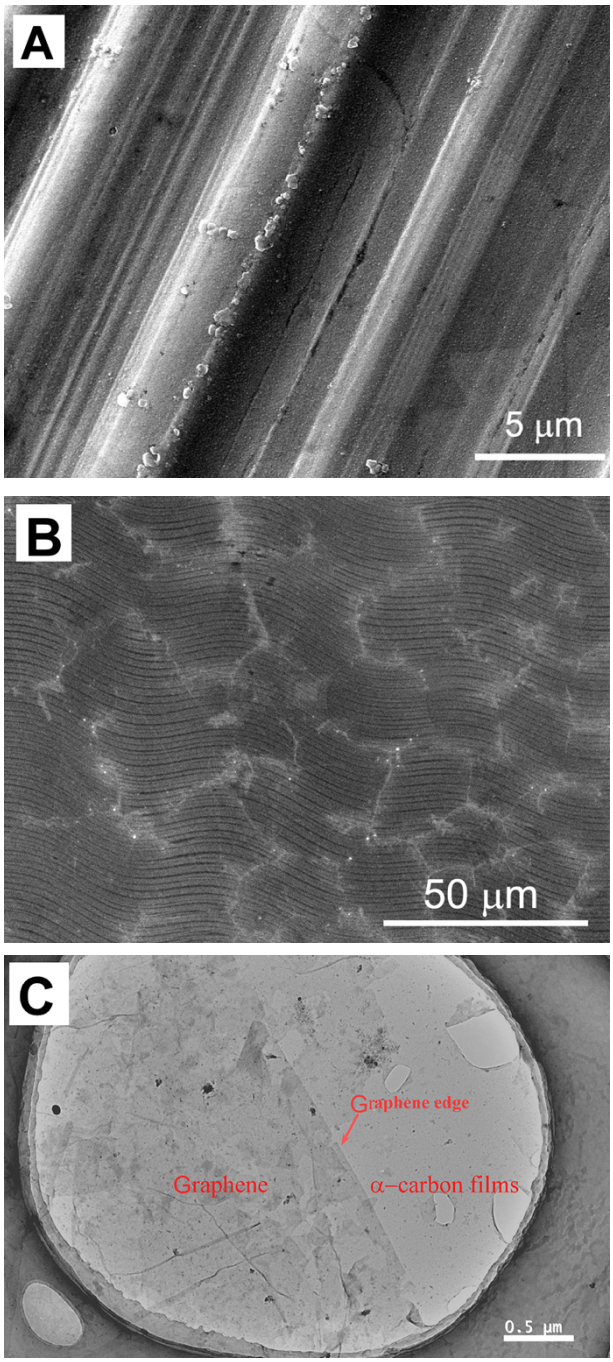

Figure S2. Low-magnification SEM images of (A) a Cu foil that was not pre-treated by acetic acid, and (B) graphene grown on Cu foil by 10 ALD cycles. (C) low-magnification TEM image of the graphene grown by 10 ALD cycles after being transferred on an α-carbon film TEM grids.

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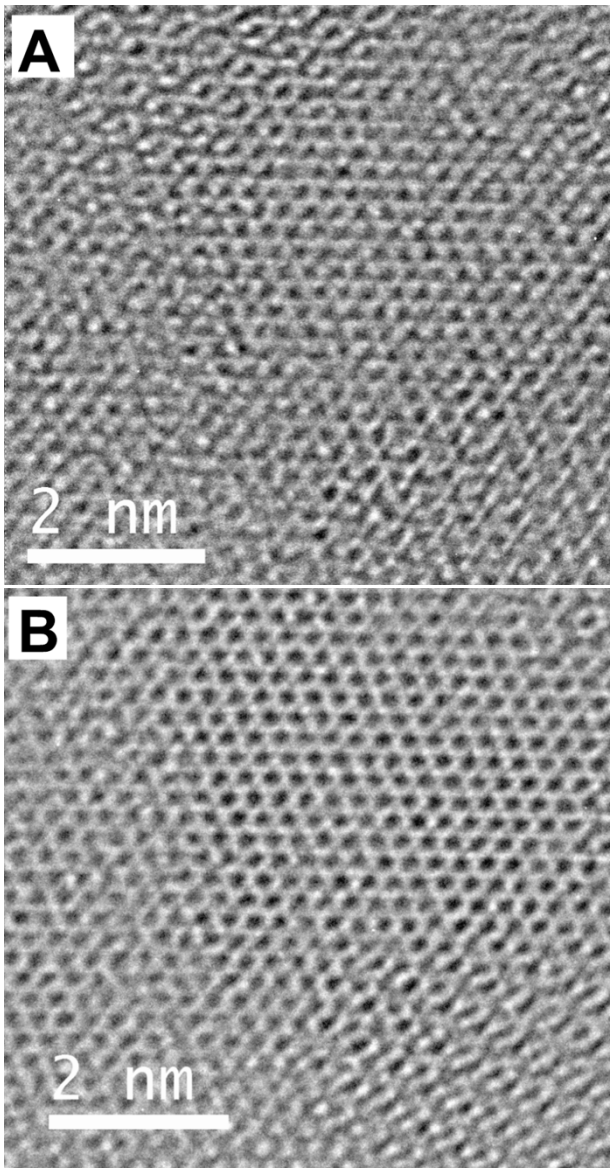

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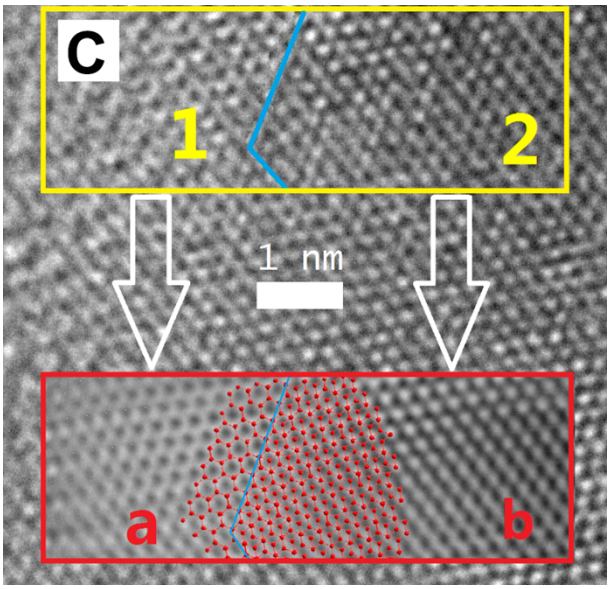

Figure S3. High-resolution TEM images of graphene taken with different focus conditions, using FEI Titan G2 60-300 at an acceleration voltage of 300 kV. (A) Image taken near the in-focus condition (defocus 85 nm and C_s -11μm); (B) Image taken with over-focus of about 5 nm (defocus 90 nm and C_s -11μm); (C) High-resolution image of the graphene with different layers; the insets are the filtered images of the corresponding areas in the yellow rectangles. It is worth noting that seemingly multilayered area is probably caused by its transfer.

(The point resolution of the TEM used can reach 0.8 Å and the gun energy resolution is ≤ 0.7 eV at an acceleration voltage of 300 kV. The images shown in Figure S3 (A) and (B) were obtained under near in-focus condition and at about 5 nm overfocus, respectively.)

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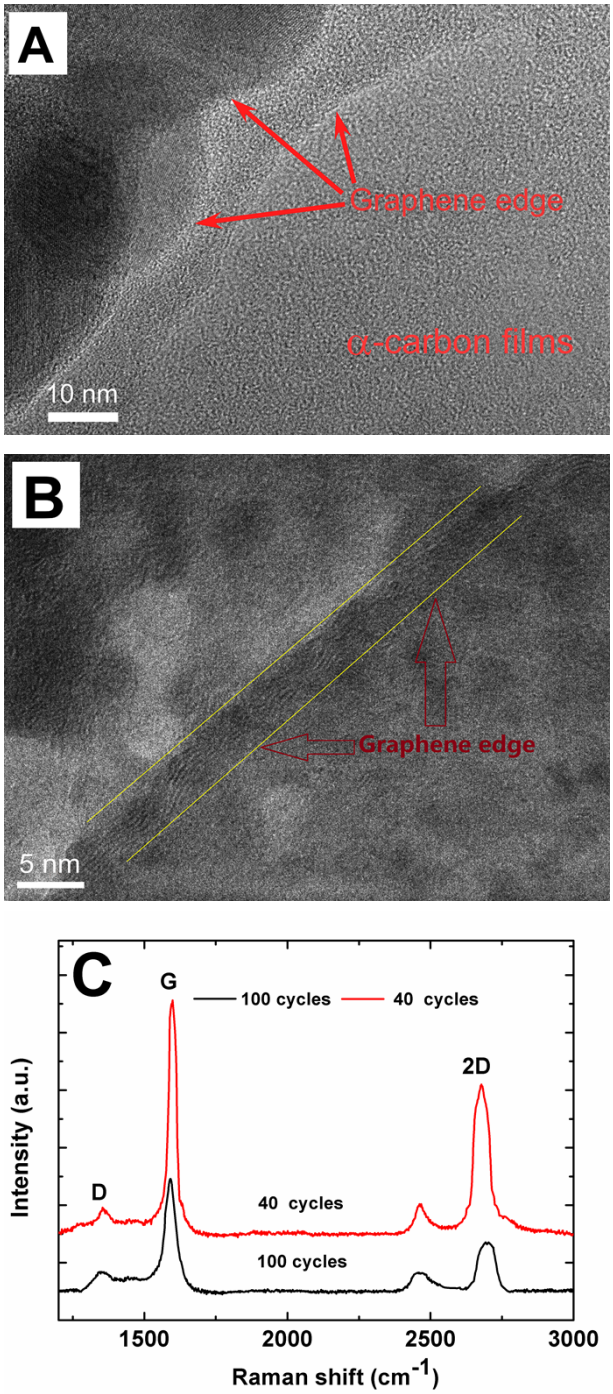

Figure S4. TEM images of the multilayered graphene films grown by 40 (A) and 100 (B) ALD cycles; (C) the corresponding Raman spectra confirming the nature of graphene layers instead of graphite.

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