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Supporting Information

Dimensional dependence of phonon transport in freestanding atomic layer systems

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Sample Preparation

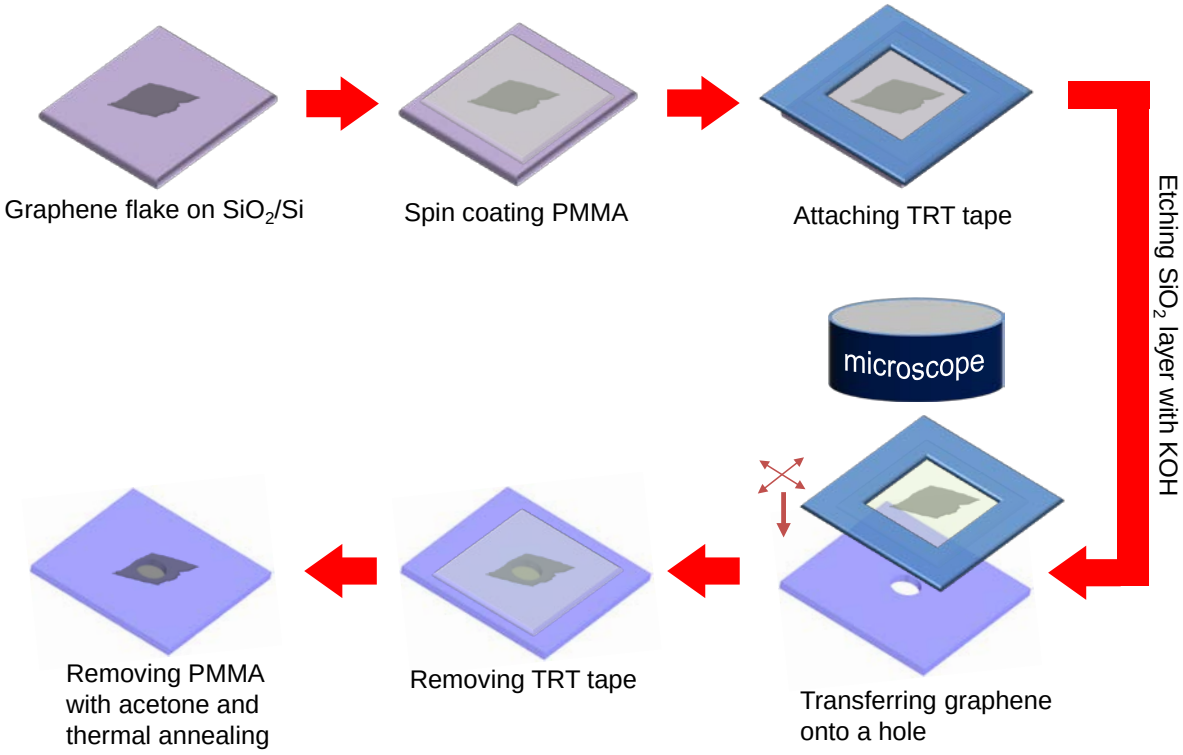

Figure S1: Preparation of suspended few-layer graphene.

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Table S1: List of prepared samples.

Sample number	Layer number	Diameter of suspended part (μm)
1	1	6.52
2	1	12
3	1	12
4	1	12
5	1	18.3
6	1	18.3
7	1	22
8	1	22
9	1	22
10	2	6.52
11	2	12
12	2	22
13	2	22
14	2	22
15	3	22
16	3	22
17	3	22
18	4	22
19	4	22
20	4	22
21	5	22
22	6	22
23	7	22
24	7	22
25	7	22

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Investigation of poly(methyl methacrylate) (PMMA) Residue on Graphene Surface

We checked the existence of PMMA residue by using 2-scan atomic force microscopy (NanoWizard, JPK instruments). At first scan, we used a contact mode with contact force of 10 nN and scan rate of 0.5 Hz to scrape and move the PMMA residue to the boundary of the scanning area. After that, we scanned larger area under a tapping mode with scan rate of 0.1 Hz to check the difference in the surface morphology between the area scanned under the contact mode and the unscanned area. Figure S2(a) and (b) show the surface morphology of the 2-layer graphene before and after the thermal annealing. Figure S2(a) shows that the surface morphology of the area scanned under the contact mode (dotted lined rectangle) is obviously different from that of the unscanned area. This indicates that the PMMA residue exist on the surface of the graphene before the thermal annealing. On the other hand, for the sample after the thermal annealing, the difference in the surface morphology is negligible. Hence, we could conclude that the PMMA residue is almost clearly removed by the thermal annealing process. We also checked if the PMMA residue on the graphene surface affects the thermal conductivity of the graphene by measuring the thermal conductivity before and after the thermal annealing of the graphene. Our result shows that the thermal conductivity of the graphene does not significantly change according to the change in the PMMA residue. This indicates that the PMMA on the graphene surface does not seriously affect the heat transport in the graphene after wet-etching of PMMA.

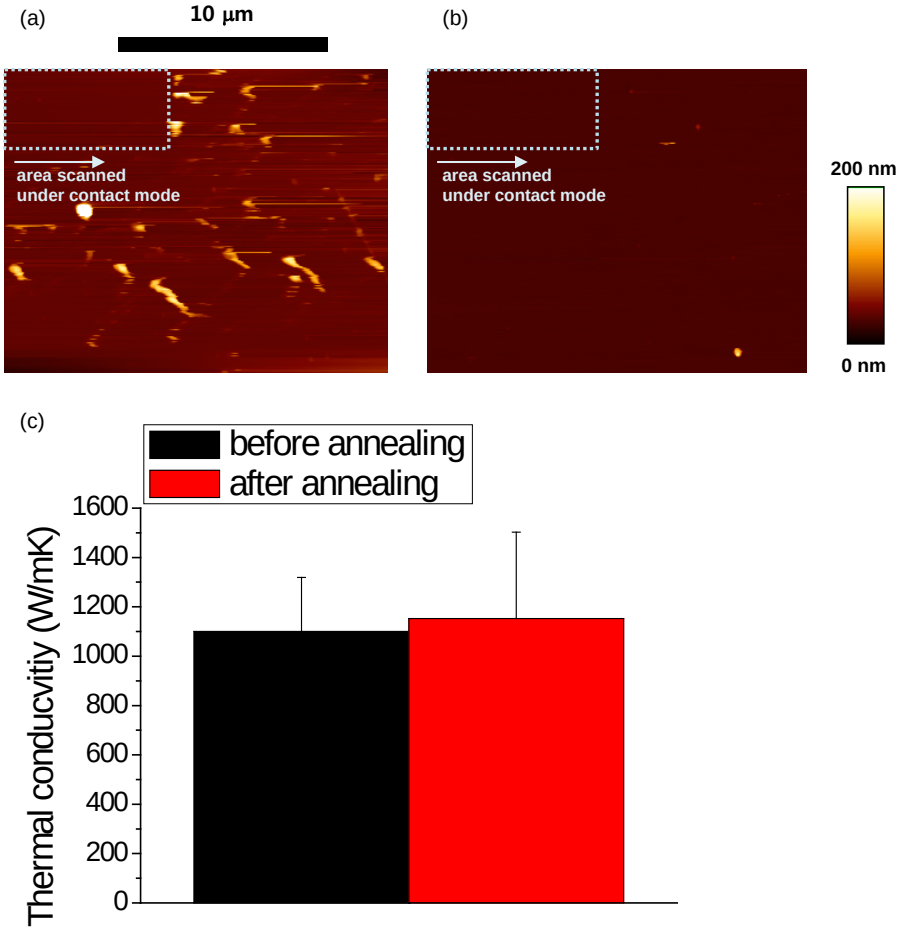

Figure S2. AFM images for surface of 2-layer graphene sample (a) before and (b) after the thermal annealing. (c) Thermal conductivity of 2-layer graphene.