Supplementary Material

Electronically triggered tunable terahertz signal observed in LPCVD grown single layer graphene

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The contents of supplementary material are listed as follows:

S1. LPCVD synthesis method for single layer graphene (SLG) on Cu foil

S2. Cleaning of Cu foil prior to synthesis

S3. Transfer process of SLG

S4. XRD patterns of bulk HOPG crystal

S5. Raman spectrum of HOPG crystal

S6. Optical images of SLG on Cu at various magnifications

S7. Time domain THz signal of SLG while (a) on same polarity, and (b) polarity has been changed

Supplementary Figures

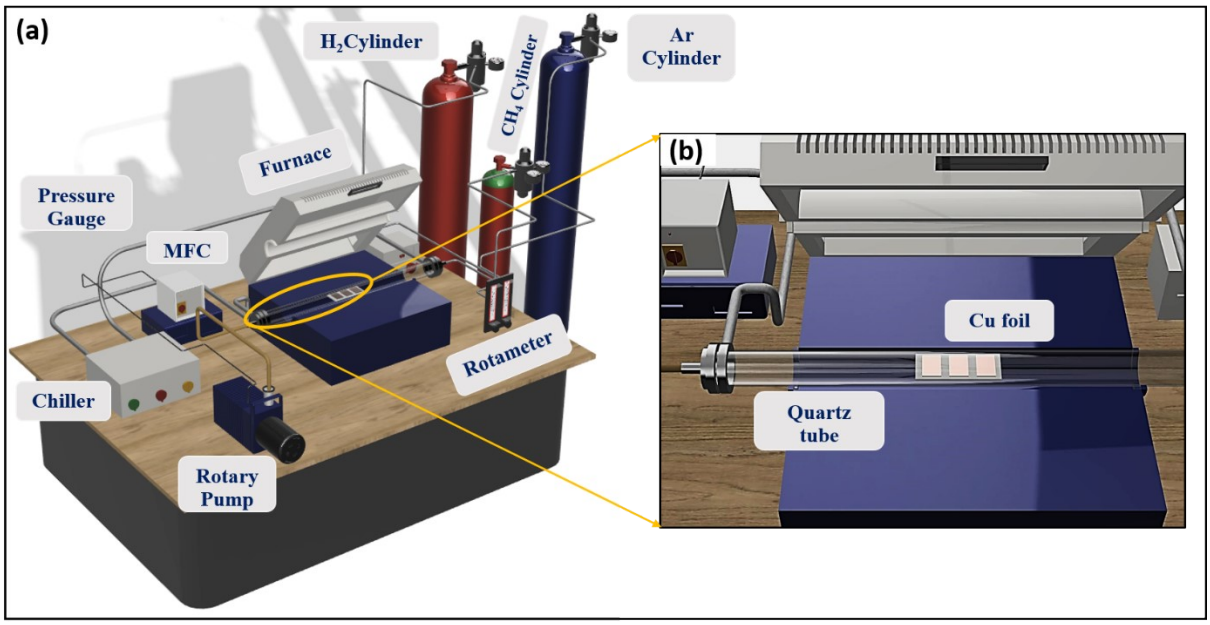

Fig. S1. (a) Schematic representation of LPCVD setup, (b) inside view of furnace where Cu foil is placed inside quartz tube.

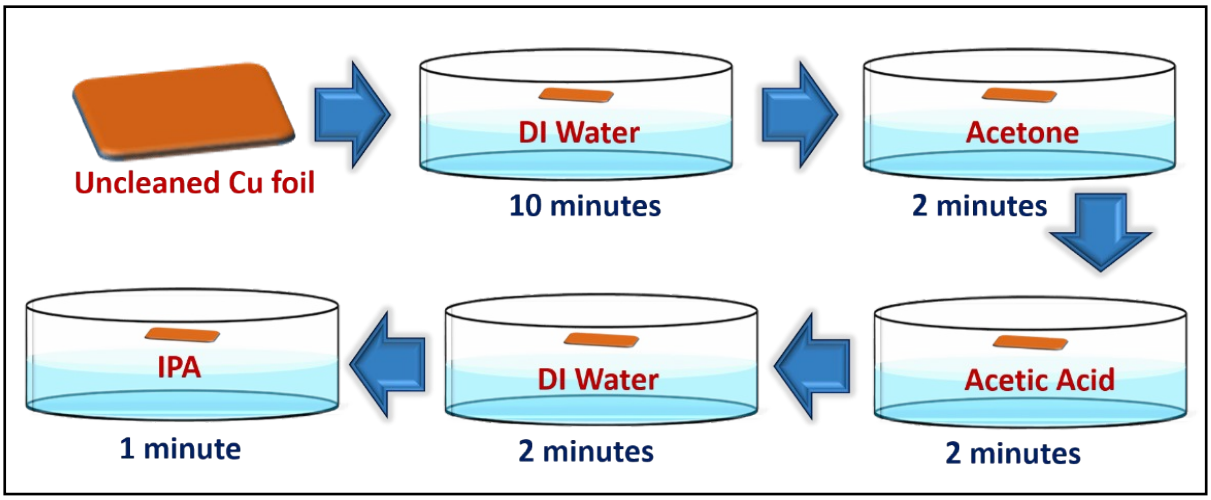

Fig. S2. Cleaning procedure of Cu foil prior to synthesis [1,2,3,4].

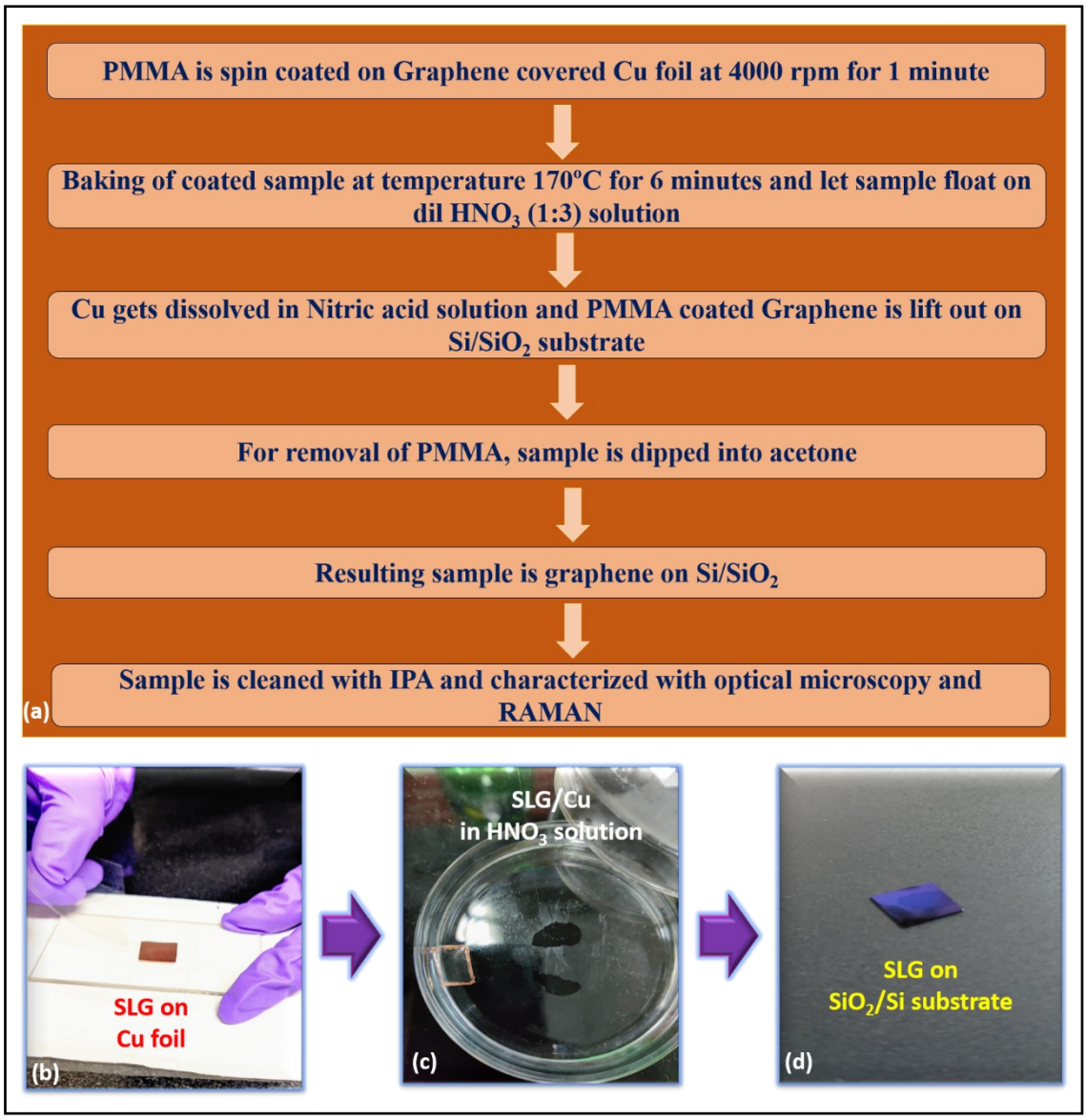

Fig. S3. (a) Systematic steps for transfer of SLG from Cu foil, (b-d) pictures taken during transfer process [1,2,5].

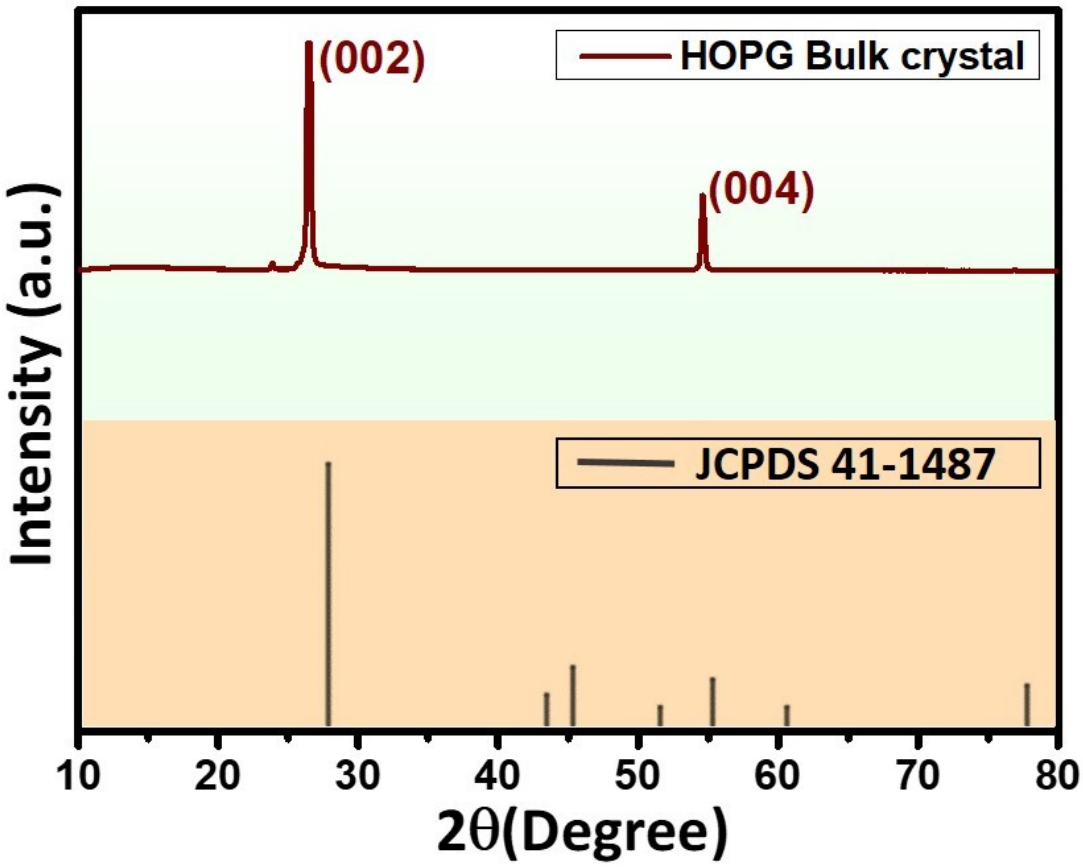

Fig. S4. XRD spectra of HOPG bulk crystal and JCPDS 41-1487.

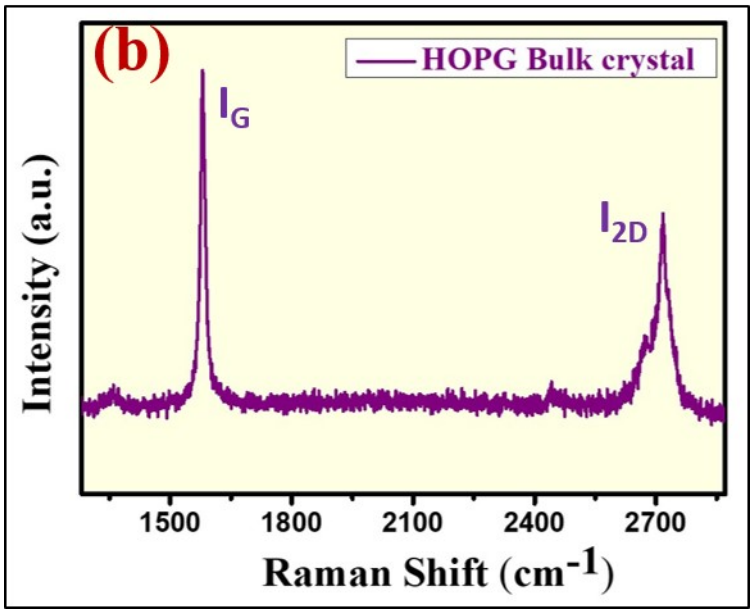

Fig. S5. Raman spectrum of HOPG bulk crystal.

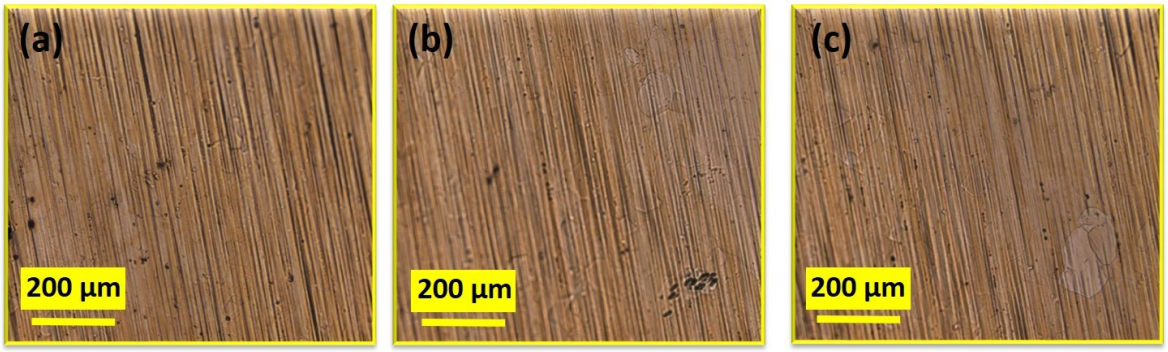

Fig. S6. Optical micrographs of SLG on Cu foil in which grains are clearly visible, scale bar is mentioned.

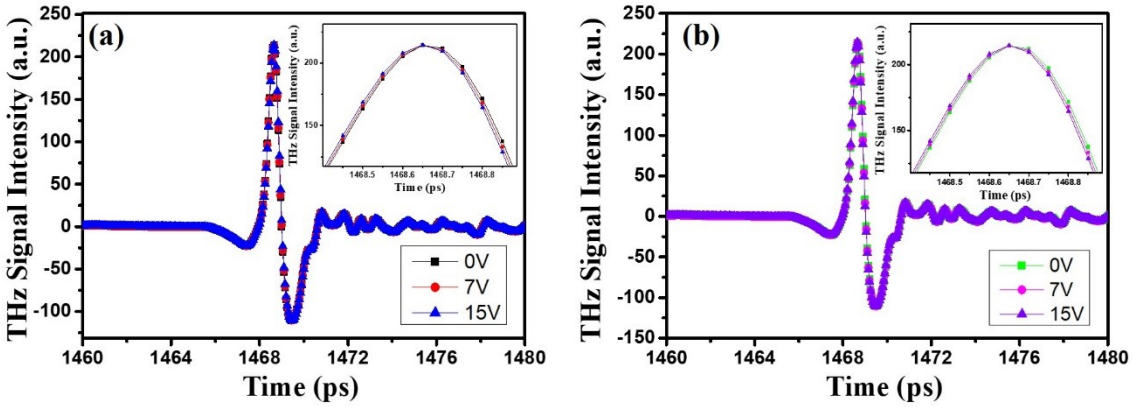

Fig. S7. Time domain THz signal of SLG while (a) on same polarity, and (b) polarity has been changed.

References

1. Kashyap, Pradeep Kumar, Indu Sharma, and Bipin Kumar Gupta, Continuous growth of highly reproducible single-layer graphene deposition on Cu foil by indigenously developed LPCVD setup, *ACS omega*, 2019, **4**(2), 2893-2901.
2. Papanai, G.S., Singh, J., Sharma, N.D., Ansari, S.G. and Gupta, B.K., Temperature dependent Raman scattering of directly grown twisted bilayer graphene film using LPCVD method, *Carbon*, 2021, **177**, 366-376.
3. Pham, Trung T., Trung H. Huynh, Quyet H. Do, and Thanh KV Ngo, Optimum reproduction and characterization of graphene on copper foils by low pressure chemical vapor deposition, *Materials Chemistry and Physics*, 2019, **224**, 286-292.
4. Gao, L., J.R. Guest, and N.P.J.N.l. Guisinger, Epitaxial graphene on Cu (111), *Nano letters*, 2010, **10**(9), 3512-3516.
5. Losurdo, M., Giangregorio, M.M., Capezzuto, P. and Bruno, G., Graphene CVD growth on copper and nickel: role of hydrogen in kinetics and structure, *Physical Chemistry Chemical Physics*, 2011, **13**(46), 20836-20843.