Supporting information for: Fully Suspended Reduced Graphene Oxide Photodetector with Annealing Temperature-dependent Broad Spectral Binary Photoresponses

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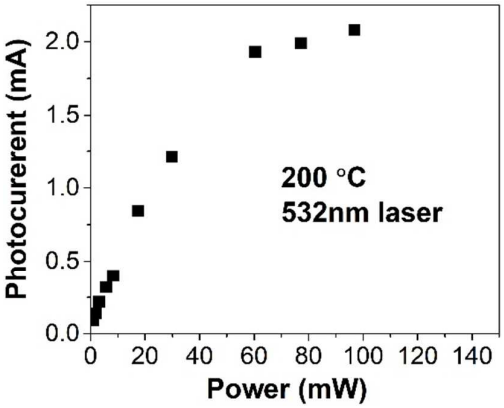

Figure S1: Photocurrents of detector based on RGO thin film prepared by eight cycles of drop-casting and annealing at 200 °C as a function of illumination power under laser illumination of 532 nm (VIS) at a bias voltage of 0.5 V.

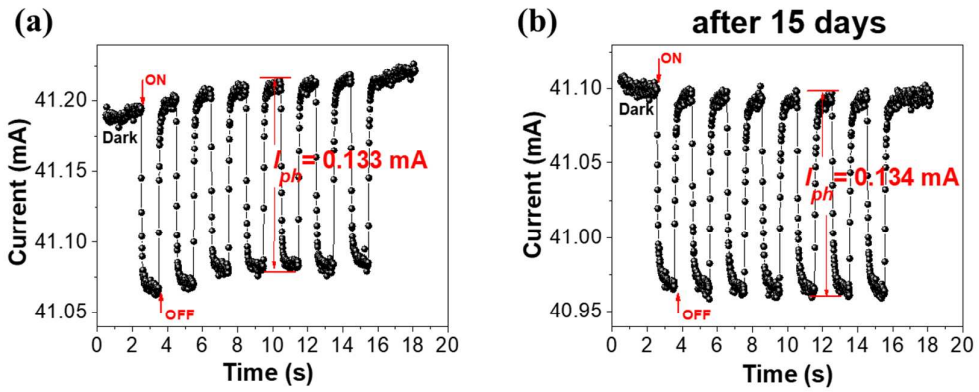

Figure S2: Long term stability of fully suspended RGO photodetector based on free-standing RGO thin film prepared at six cycles of drop-casting and annealing at 1000 °C. (a) Freshly prepared photodetector (b) after the photodetector was placed for 15 days at room temperature in air. Time-resolved photoresponses were measured under laser illumination of 532 nm of 15.1 mW at a bias voltage of 0.5 V. The time interval between two collected data points was set as 13 ms, which is faster than 18 ms in the main text.

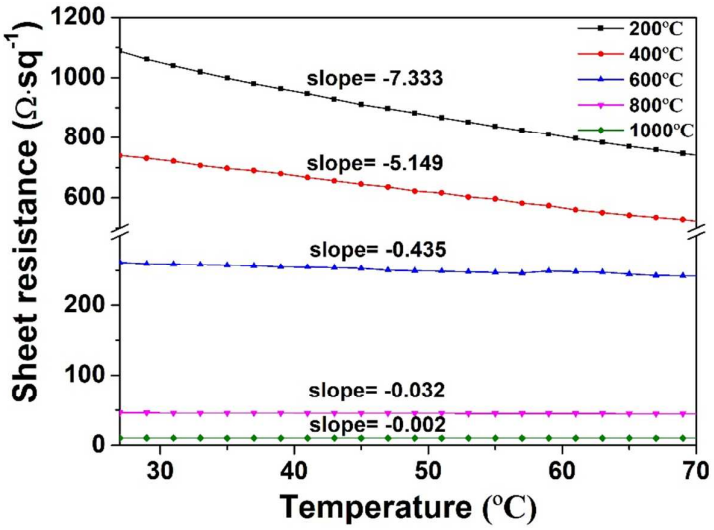

Figure S3: Sheet resistance-temperature plots of RGO thin films prepared at different annealing temperatures measured between 27 °C to 69 °C in vacuum.

Figure S3 clearly indicates that sheet resistance-temperature curves possess negative slope, *i. e.*, the sheet resistance of all films decrease when temperature of films rise. More importantly, the absolute values of slope decrease with increasing reduction level of RGO, *i. e.*, RGO becomes less and less sensitive to temperature change.

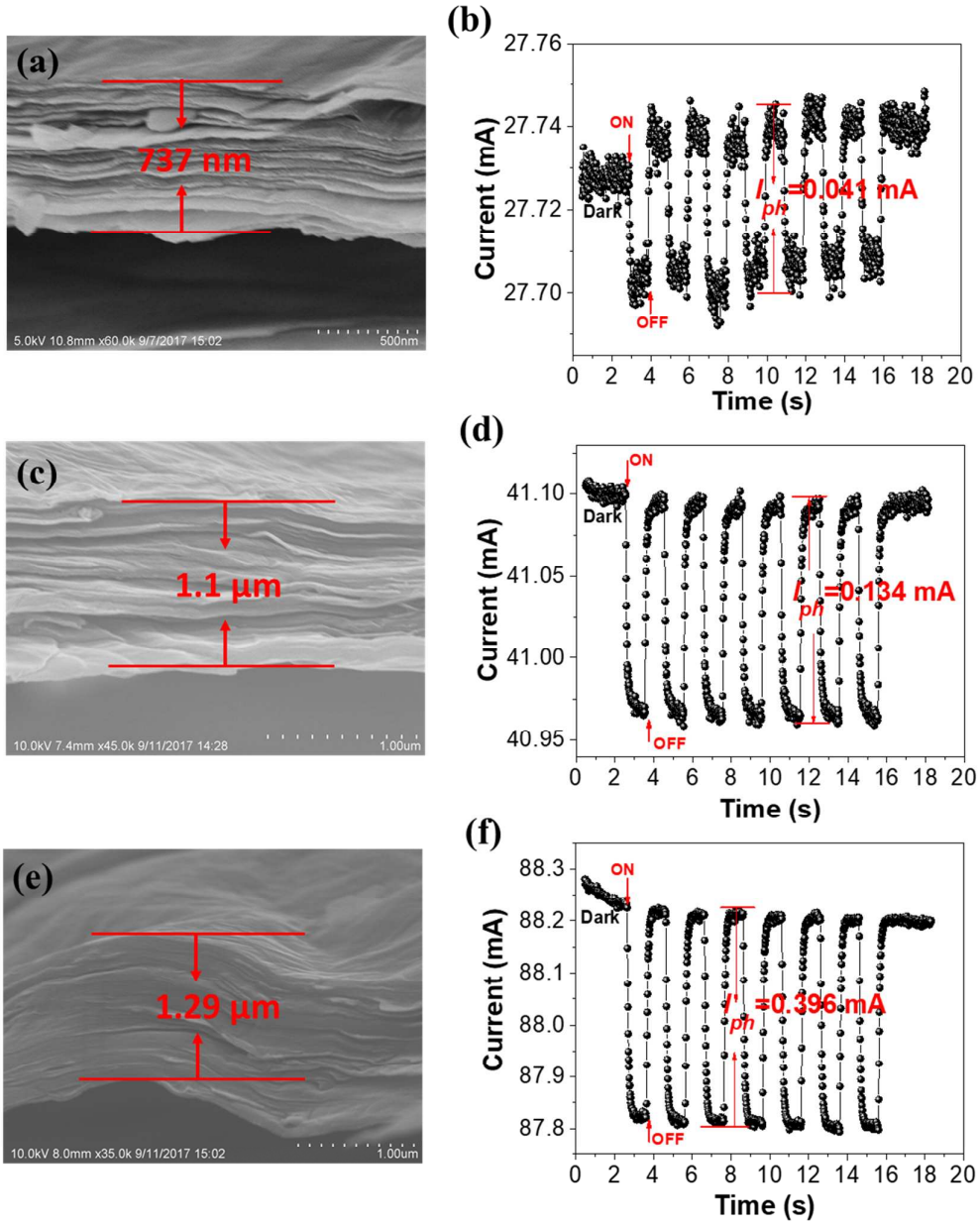

Figure S4: Effects of film thickness on photoresponse. Cross-sectional view SEM images of RGO thin films prepared by (a) four, (c) six and (e) eight drop-casting cycles, respectively and annealing at 1000 °C. (b), (d) and (f) their respective photoresponse measured under laser illumination of 532 nm of 15.1 mW at a bias voltage of 0.5 V. The time interval between two collected data points was set as 13 ms, which is faster than 18 ms in the main text.

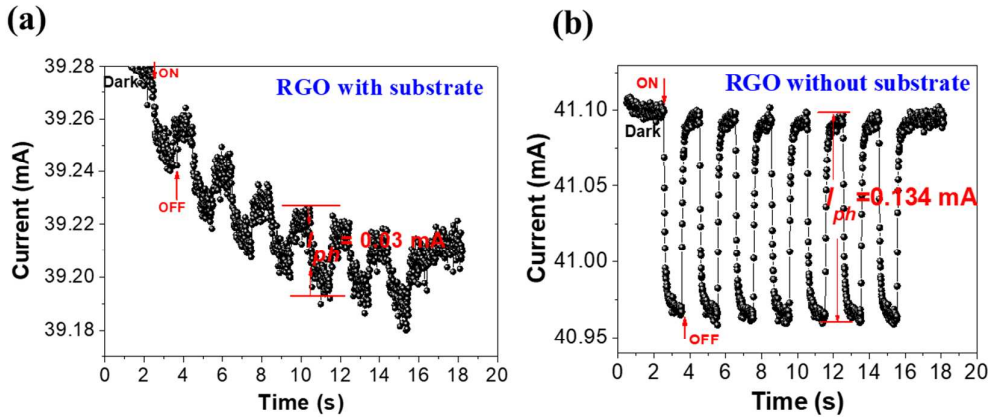

Figure S5: Comparison of photoresponses of fully suspended photodetector with substrate supported photodetector. The RGO thin films prepared by six drop-casting cycles and annealing at 1000 °C. The photoresponse measured under laser illumination of 532 nm of 15.1 mW at a bias voltage of 0.5 V. The time interval between two collected data points was set as 13 ms, which is faster than 18 ms in the main text.