Infrared-driven Flexible Pyroelectric Generator for Non-contact Energy Harvester

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Supporting information

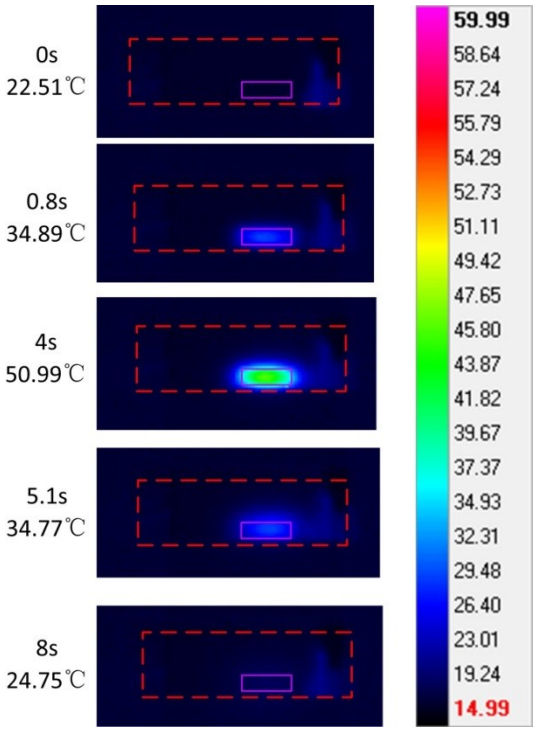

Figure S1 Thermal image of the graphene/PVDF/Al when nIR irradiating. The PG device in size of 5 mm × 20 mm (as shown in dotted red box) was irradiated by nIR laser with 5 mm × 2 mm in spot size (as shown in solid box). The temperature was measured from the whole sample and the values we used in text were the average values of the hot regions. From the thermal image, the temperature can be 296 K to 324 K during 4 s light on, and then the temperature drop from 324 K to 296 K when the light is off.

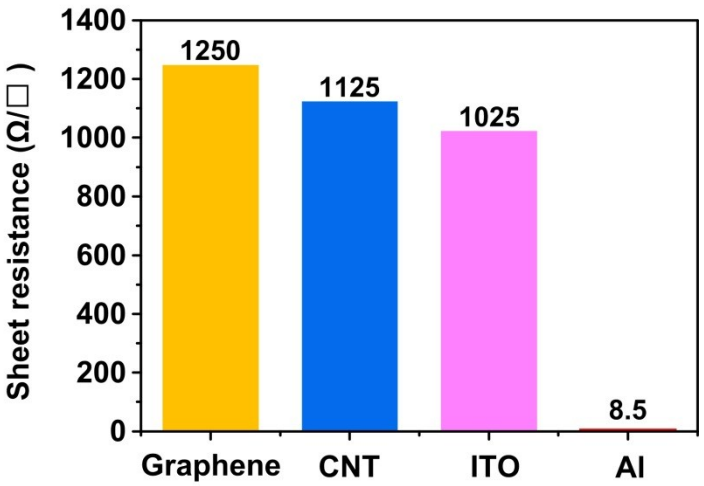

Figure S2 The sheet resistance of graphene, CNT, ITO and Al.

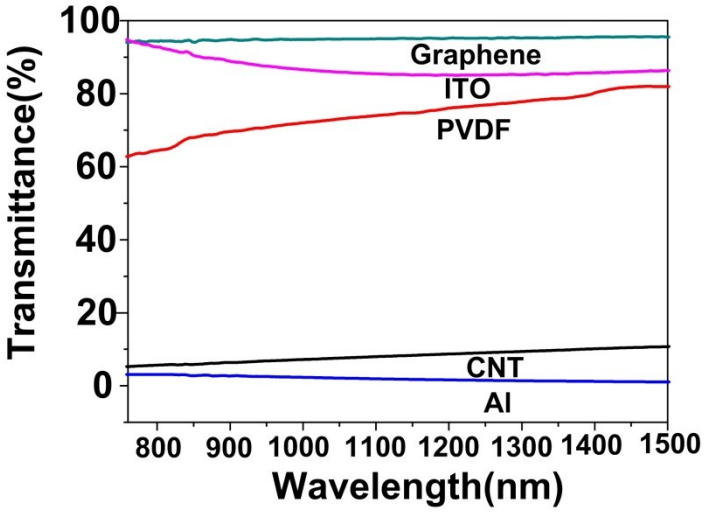

Figure S3 Transmittance spectra of graphene, CNT, Al and PVDF film.

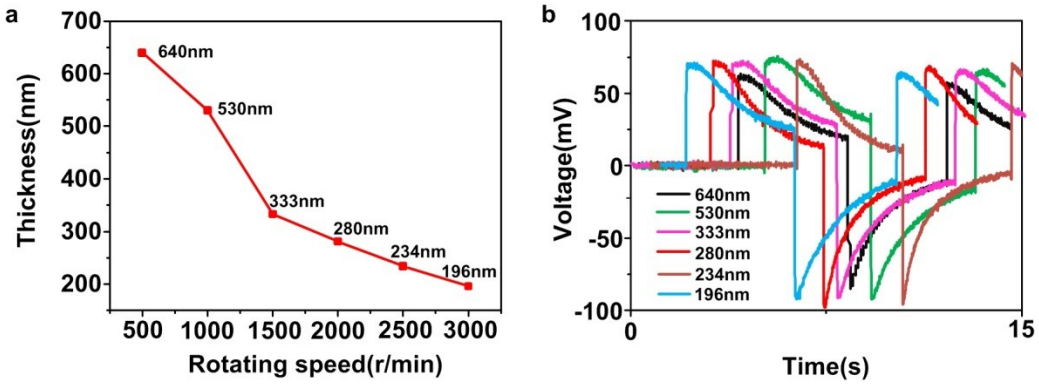

Figure S4 (a) Measured CNT thickness under different rotate speeds. (b) Measured output voltages of PG (CNT/PVDF/Al) with different CNT thickness**.**

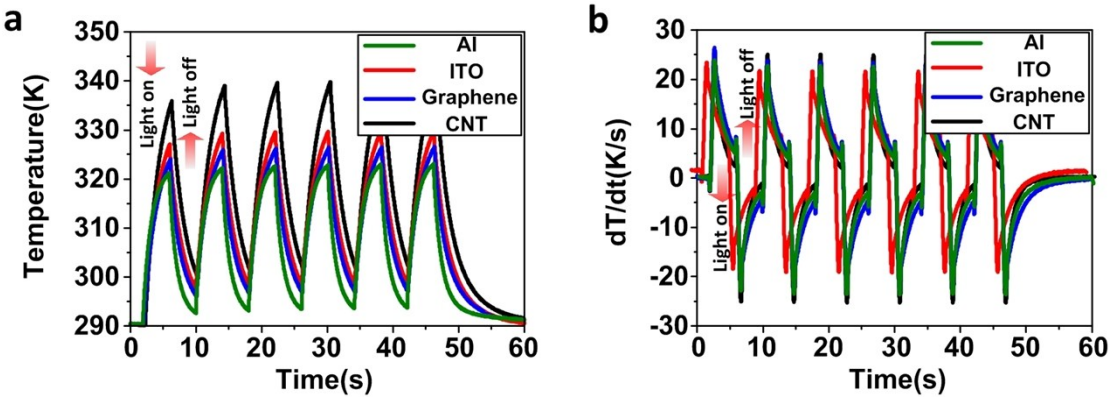

Figure S5 Developed (a) temperature and (b) temperature-change rate for PG with Al, ITO, graphene and CNT as bottom electrode respectively when the top electrode is fixed as CNT at temperature oscillation of 0.125Hz.

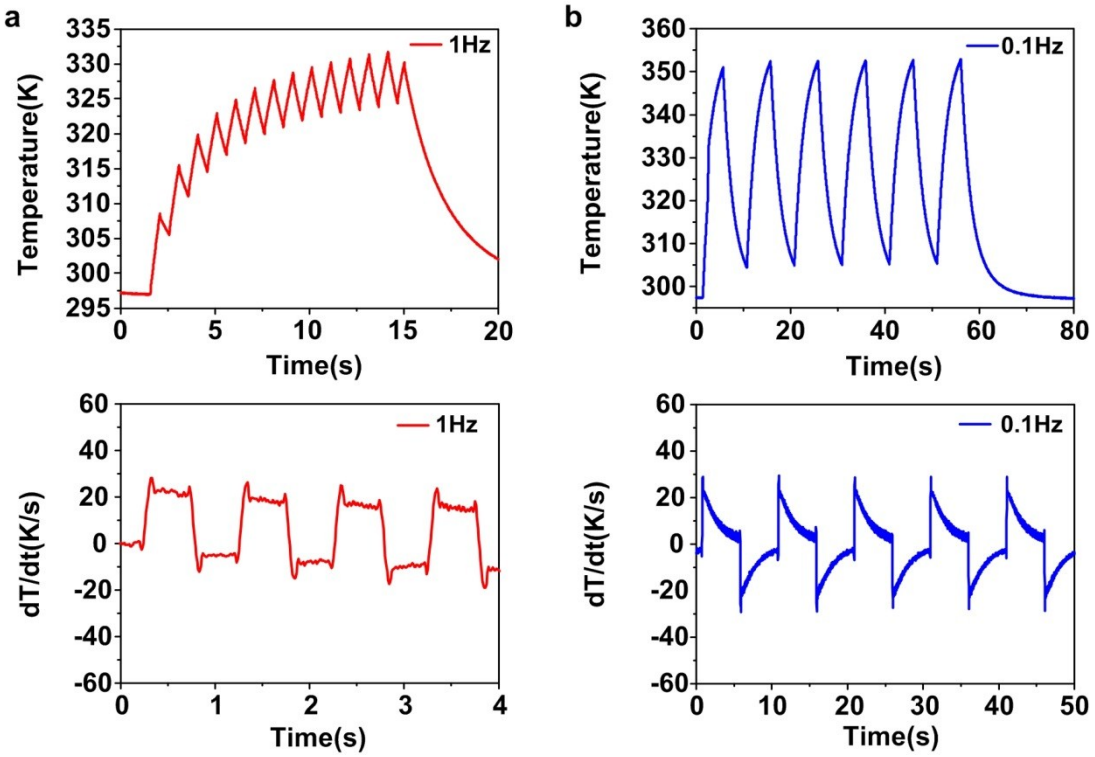

Figure S6 The temperature and temperature-change rate of CNT/PVDF/CNT sandwich under irradiation frequency of (a) 1 Hz and (b) 0.1 Hz. The temperature of PG continues to rise (nearly straight line) during the irradiation process under 0.1 Hz. But the temperature of PG under 1 Hz rises slowly (curve with a certain curvature) during the irradiation process. By taking a derivative with respect to measured temperature of PGs, it was observed that the temperature-change rate of PG under 0.1 Hz (Figure S6a) is similar to the voltage waveform in Figure 3d. So the temperature-change rate of PG determines the output waveform.

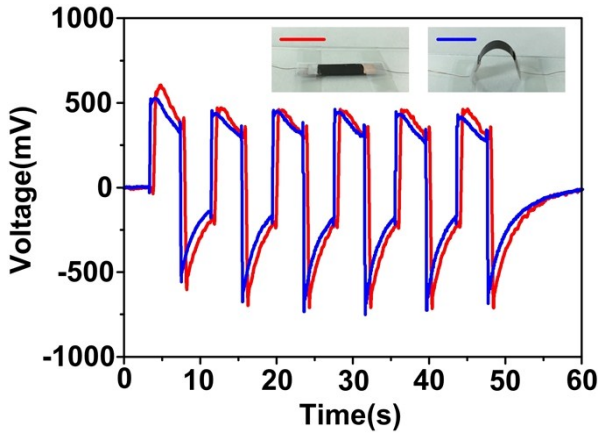

Figure S7 Measured output voltage of PG under flat and bending state. The bending radius is about 5 mm (the area of the device is 20 mm × 5 mm). Compared to the results under bending and flat state, we found that they are almost no difference. It can demonstrate the flexibility of PG to some extent.