Supporting Information

A general route towards patterning of graphene oxide by a combination of wettability modulation and spin-coating

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1. The spin-rate effects on surface uniformity and coverage of *GOs*.

The uniformity in a simple and between samples is almost the same, if we chose same *GOs* concentration, O_3 treating time and spin coating speed. When the spin-rate is low, the substrate needs more time to dry its' surface and the uniformity of the *GOs* is poor, especially at the edge of the substrate (see Figure S1a). And the uniform area is increasing with the spin rate increasing, even in a shorter spin-coating time (see Figure S1b). Further, AFM measurements were performed on different dry substrates to see the relationship between spin rates and the coverage (see Figure S1c and S1d). The coverage was decreased as the spin rate increasing. When the spin rate > 3000 r/m, the film uniformity and coverage are at a good level.

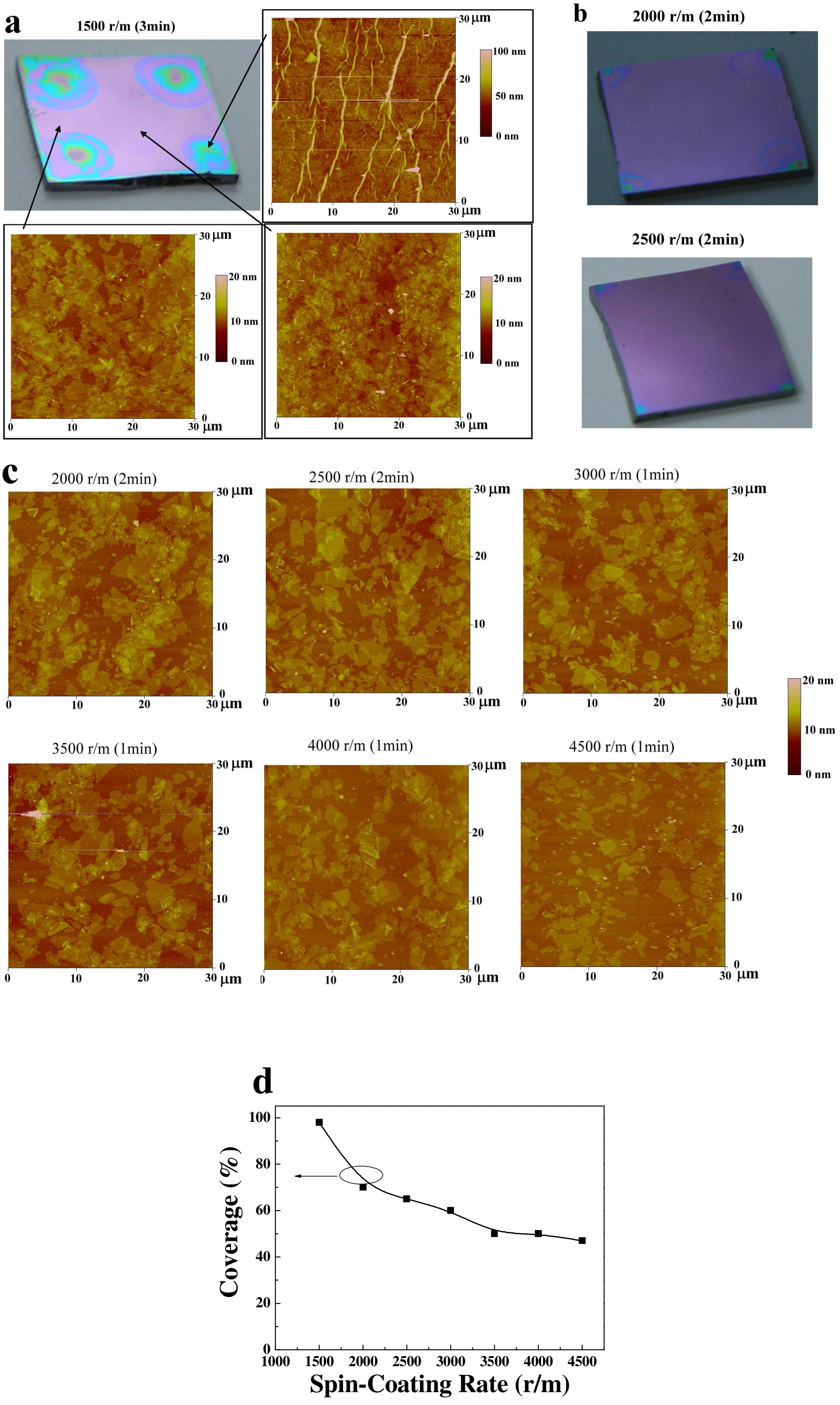
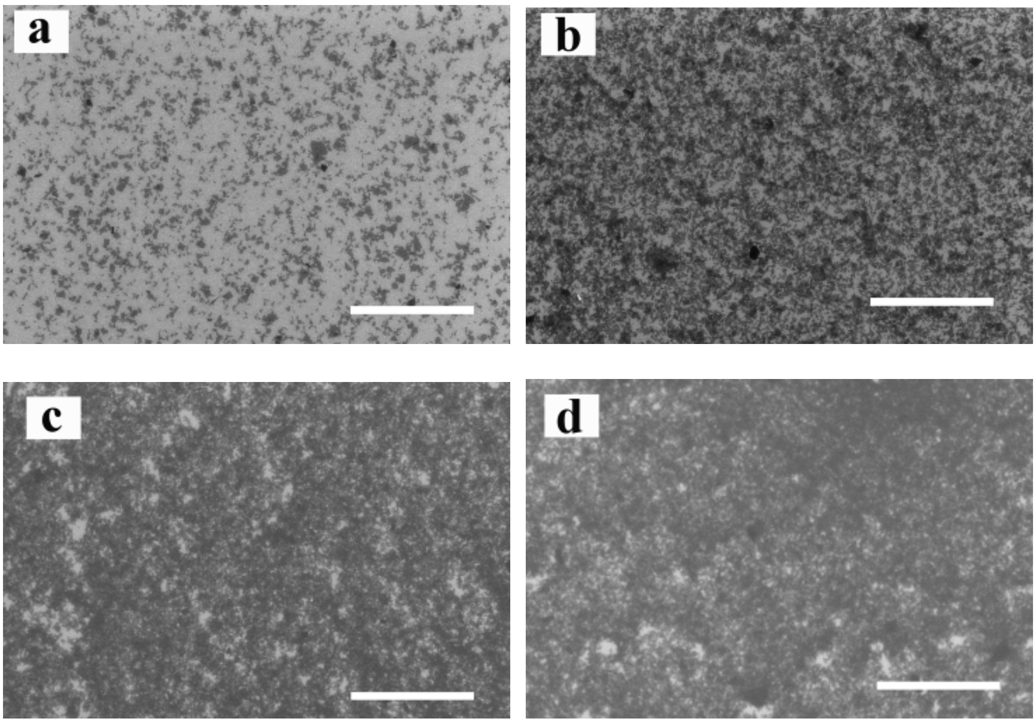

a
1500 r/m (3min)
100 nm
50 nm
0 nm
20 nm
10 nm
0 nm
30 μm
b
2000 r/m (2min)
2500 r/m (2min)
c
2000 r/m (2min)
2500 r/m (2min)
3000 r/m (1min)
3500 r/m (1min)
4000 r/m (1min)
4500 r/m (1min)
20 nm
10 nm
0 nm
d
Coverage (%)
Spin-Coating Rate (r/m)

Figure S1. (*a*) Pictures of bad uniformity substrate with spin-coating rate 1500 r/m (3 min). *AFM* images are highly different in different areas. (*b*) Pictures of SiO_2 substrates with spin-coating rate of 2000 r/m (2 min) and 2500 r/m (2 min). (*c*) *AFM* images of *GOs* on substrates with different spin-coating rate. (*d*) Relationship between spin-coating rate and coverage.

2. The coverage of the *GOs* on the *UVO* treated (about 180 s) SiO_2 (*PFS* modified) substrate



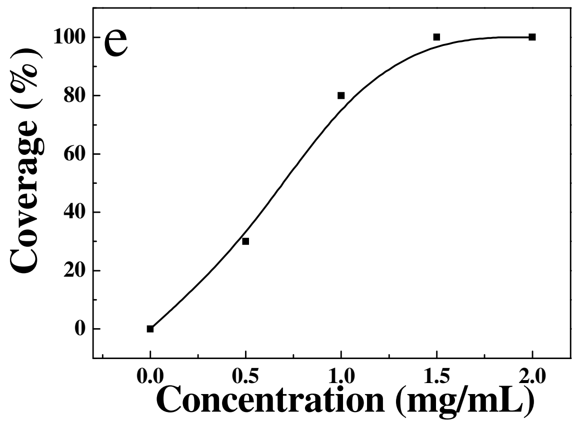


Figure S2. SEM images of different concentrations *GO* solution spin-coating on the *UVO* treated (about 180 s) SiO_2 (*PFS* modified) substrate: (*a*) 0.5 mg/mL, (*b*) 1.0 mg/mL, (*c*) 1.5 mg/mL, (*d*) 2.0 mg/mL, and (e) the corresponded *GOs* coverage plot. The scale bar is 20 μm.

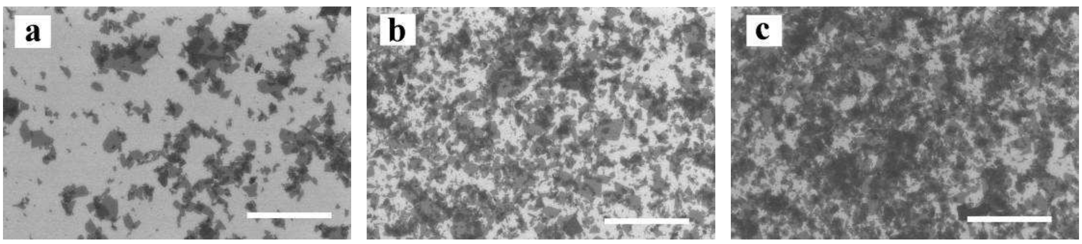


Figure S3. *SEM* images of *GOs* coverage on the *UVO* treated (about 180 s) SiO_2 (*PFS* modified) substrate with different spin-coating cycles. (*a*), 1 time; (*b*), 2 times and (*c*), 3 times. The scale bar is 20 μm.

3. The patterned results of *GO* sheets on *PFS* treated SiO_2 surface

Different shapes can be formed by the *GO* sheets though *PFS* surface patterning.

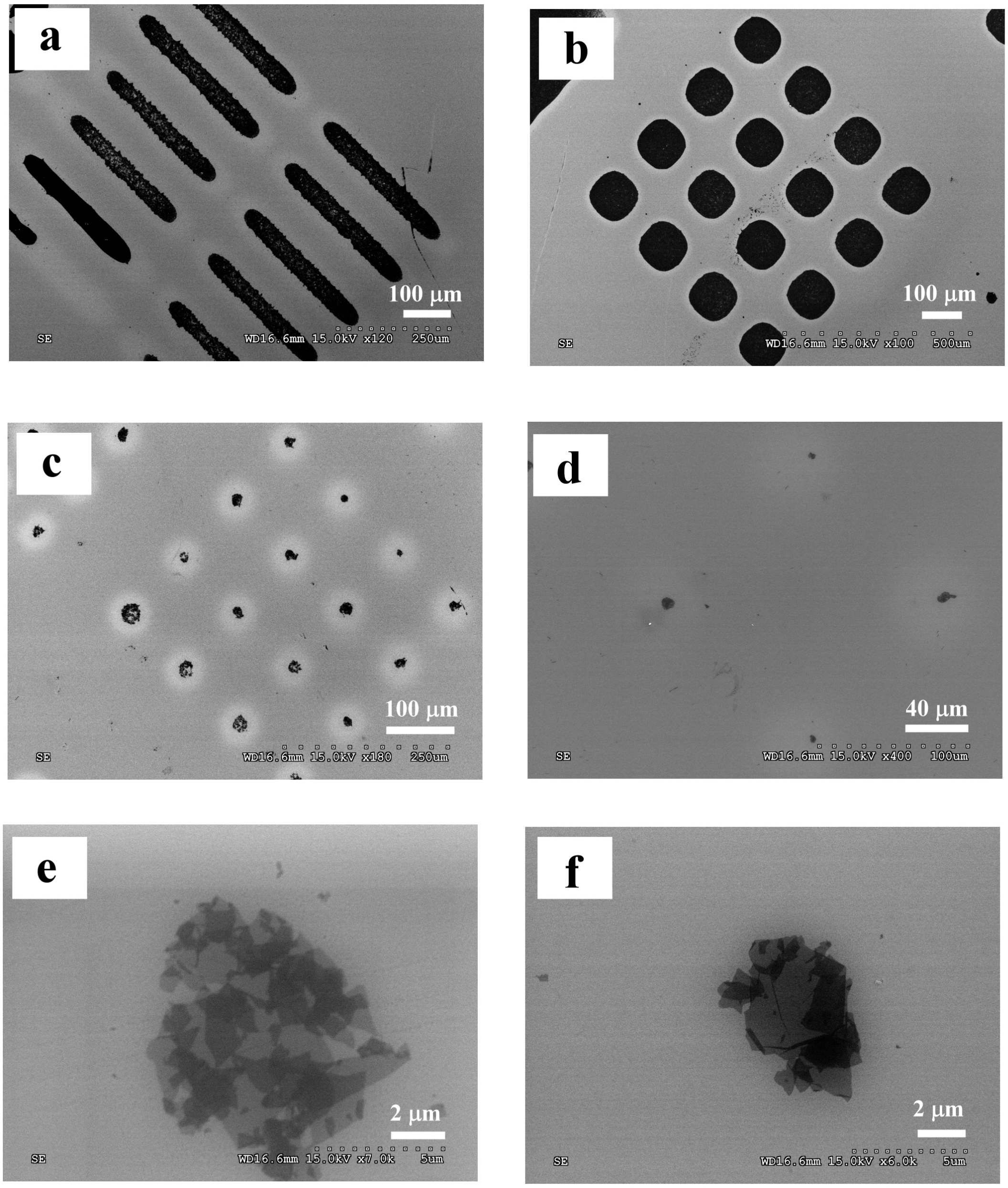


Figure S4. SEM images of patterned *GOs* (2.0 mg/mL) on patterning *PFS* surface. (*a*)–(*f*) are the different shapes and scales of patterned *GOs*.

4. The *GO* sheet coverage on Au surface

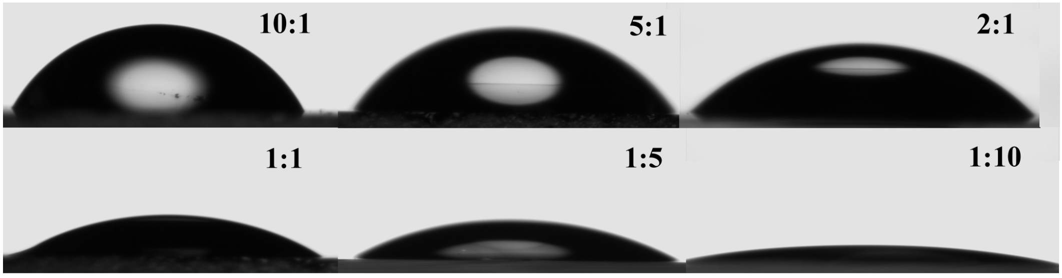


Figure S5. The contact angles on *Au* surface based on different ratios of water: ethanol.

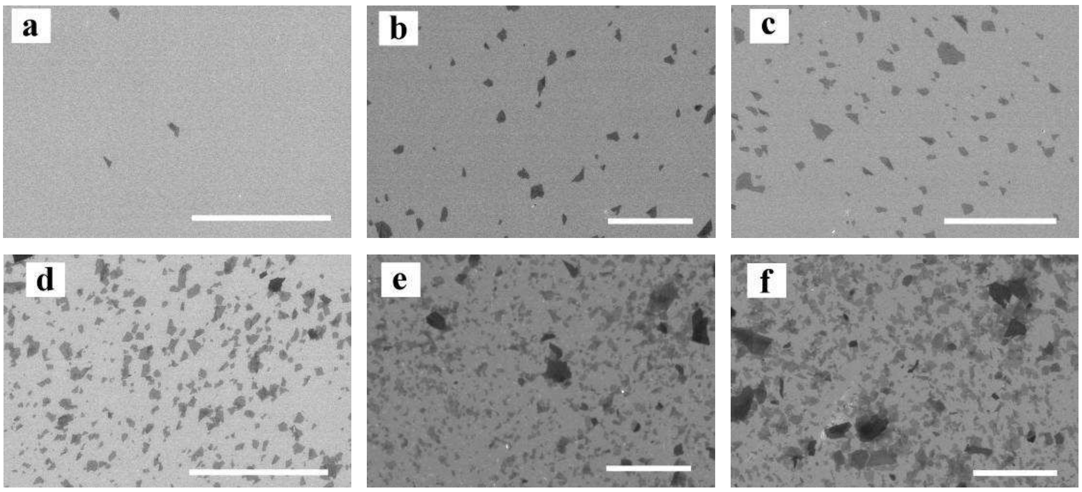


Figure S6. *SEM* images of the *GOs* coverage on *Au* surface. *GO* solution (~0.7 mg/mL) based on different water/ethanol ratio solvents: (*a*), 5:1; (*b*), 2:1; (*c*), 1:1; (*d*), 1:2; (*e*), 1:5; and (*f*), 1:10. The scale bar is 20 µm.

5. Organic field-effect transistors

The mobility of the *OFETs* in the saturation region was extracted from the following equation:

$$I_{DS} = \frac{W}{2L}\mu C_i\left(V_{GS} - V_{th}\right)^2 \quad (1)$$

where I_{DS} is the drain electrode for collecting current, C_i is the capacitance per unit area of the gate dielectric layer, V_{th} is the threshold voltage, and L and W are the channel length and width, respectively. The V_{th} of the device was determined by extrapolating the $(|I_{DS,sat}|)^{1/2}$ vs. V_{GS} plot to $I_{DS} = 0$.

Aluminum, which is considered as a bad surface for *GOs* deposition, can also be covered with *GOs* by our method.

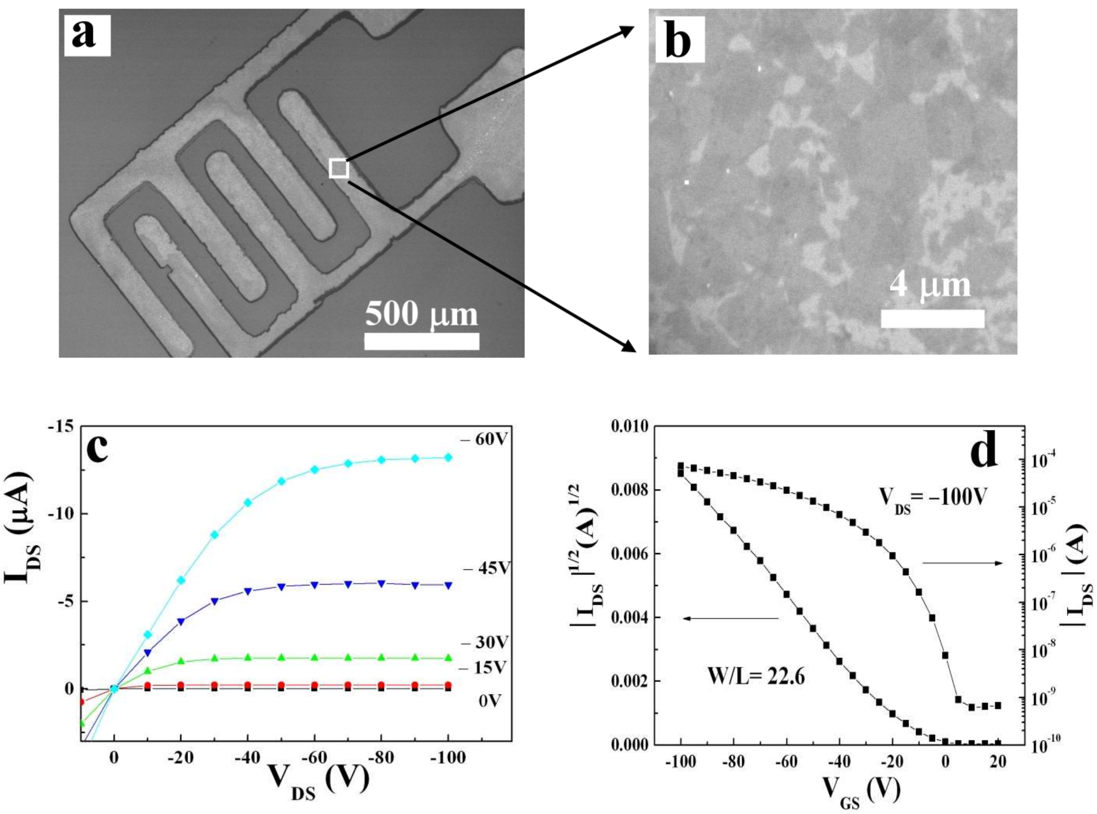


Figure S7. *SEM* images and characteristics of field-effect transistors. (*a*) *SEM* images of the *GOs* (1.5 mg/mL) covering on the *Al* surface. (*b*) Enlarge image of the contacted area. The pentacene transistors based on theses reduced electrodes (reduced at 220 ºC). (*c*) Output curves. (*d*) Transfer curves.

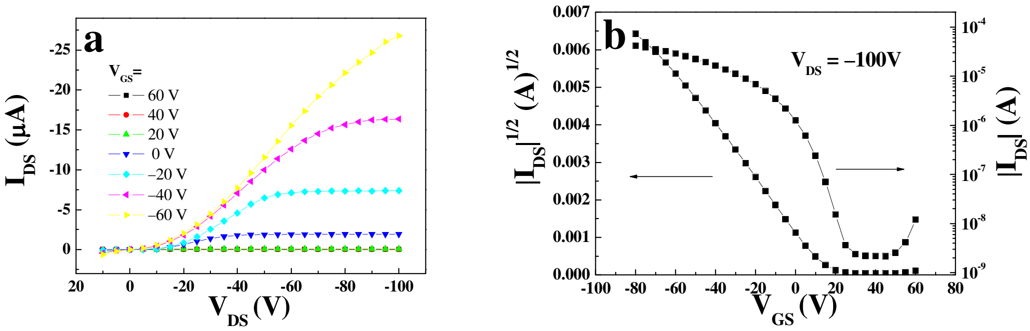


Figure S8. *I*–*V* characteristics of field-effect transistors. The transistors are based on pure *RGOs* (reduced at 220 ºC) as electrodes and pentacene as semiconductor. (*a*) Output curves. (*b*) Transfer curves.

6. *GOs* on the *PET* surface

6.1 Patterning of *GOs* on *PET* surface

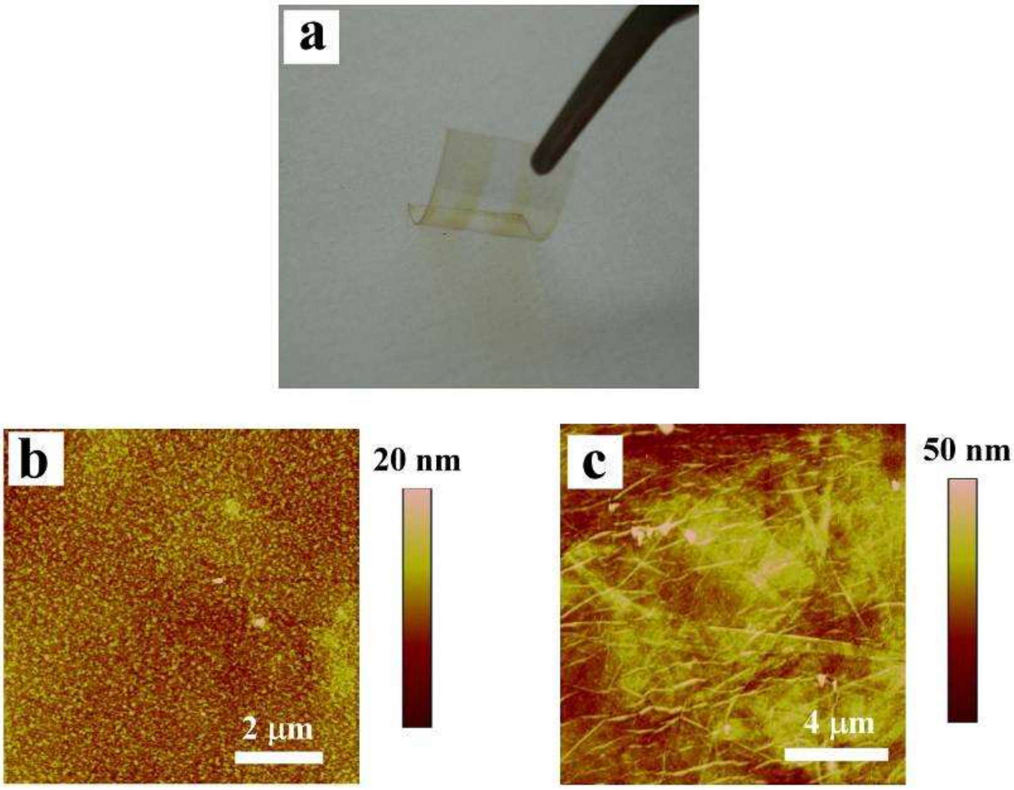


Figure S9. (*a*) Photograph of *PET* with patterned *GOs*. The corresponding *AFM* images on (*b*) dewetting area, and (*c*) wetting areas.