

(b)

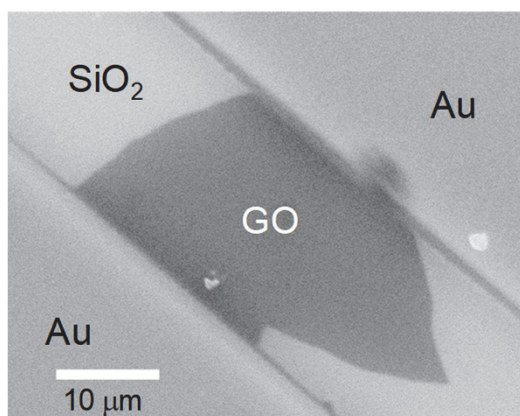


Fig. S1 (a) Preparation procedure of the sample for the *in-situ* measurement.
(b) SEM image of a monolayer GO bridging the Au electrode.

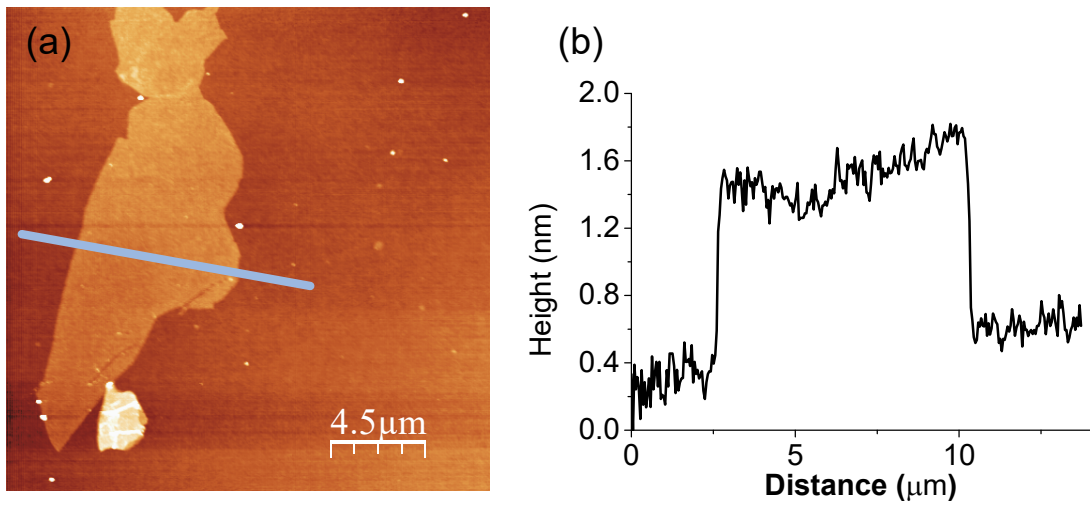


Fig. S2 (a) AFM image of monolayer GO after the treatment at 580 °C with the hot W filament at 1900 °C. The GO did not bridge Au electrode. (b) Height profile along the line in (a).

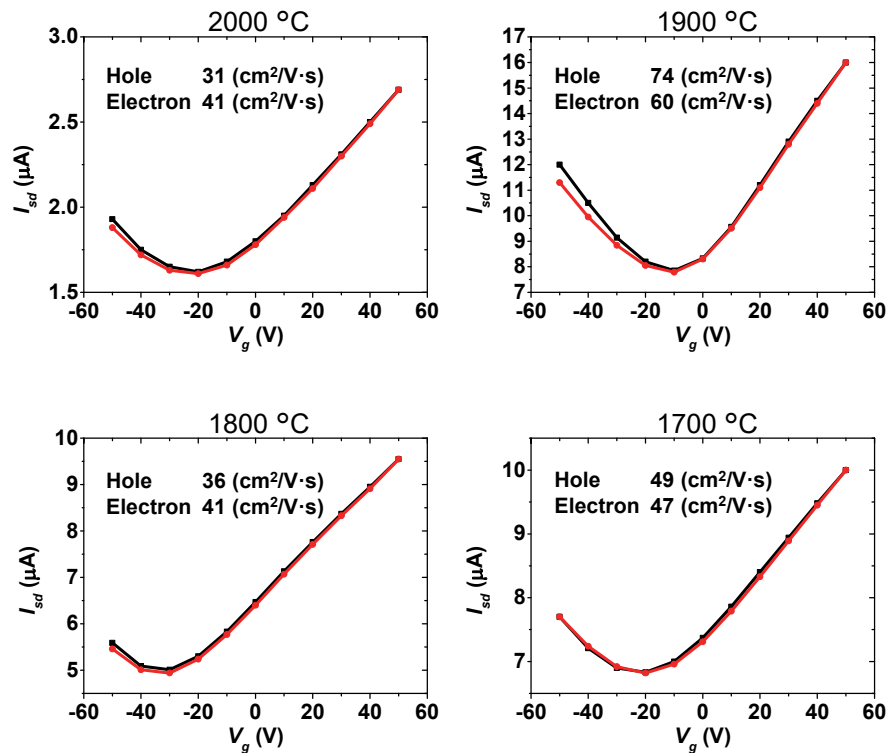


Fig. S3 FET characteristics of GO treated at 580 °C with the hot W filament of various temperatures. $V_{sd} = 0.1$ V

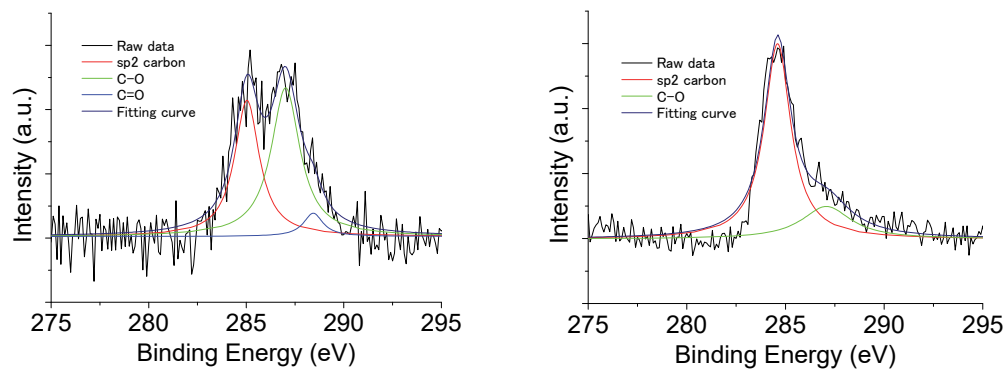


Fig. S4. XPS spectra of GO on Si. (a) As grown GO. (b) GO after the treatment at 580°C with the hot W filament at 2000°C. The remaining C-O component in (b) comes from the thick GO flakes in the region of XPS proving area (around the diameter of a few mm)

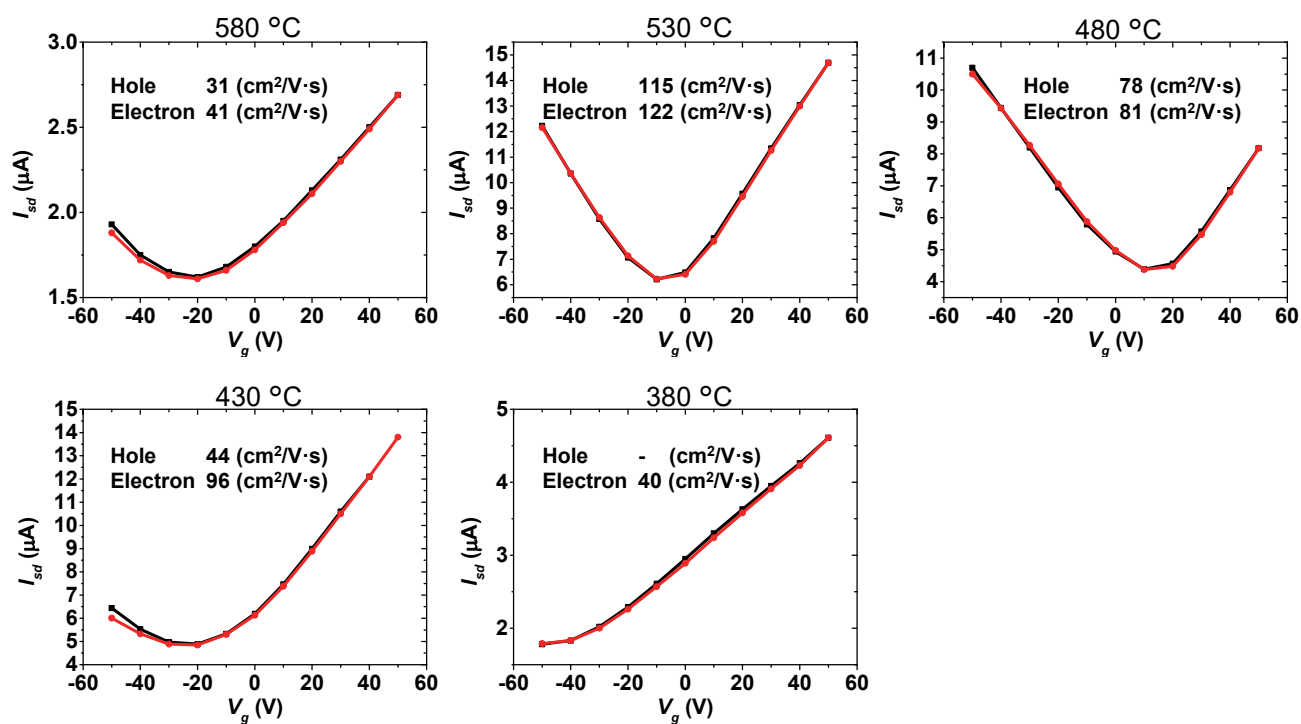


Fig. S5 FET characteristics of GO treated at various temperatures with the hot W filament at 2000 °C. $V_{sd} = 0.1$ V

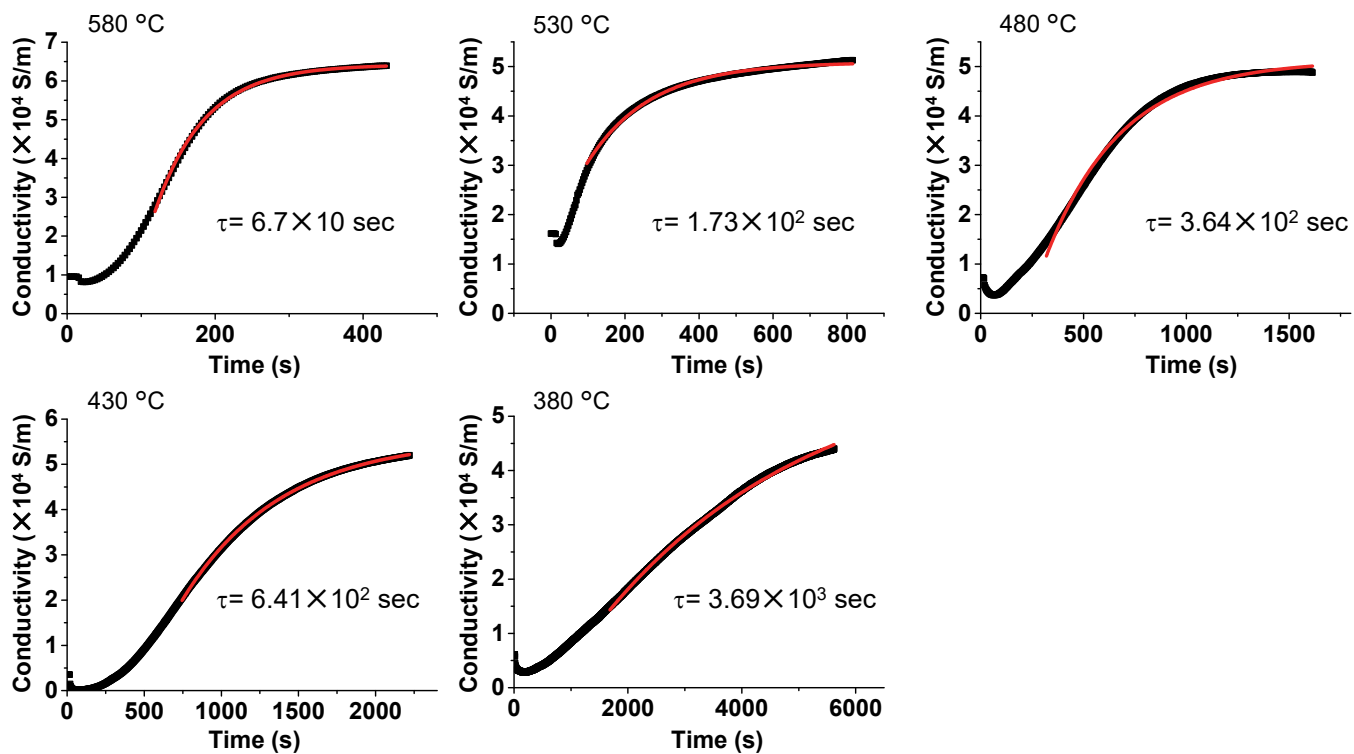


Fig. S6 The result of the curve fitting of conductivity at each substrate temperature.