Supplementary Information

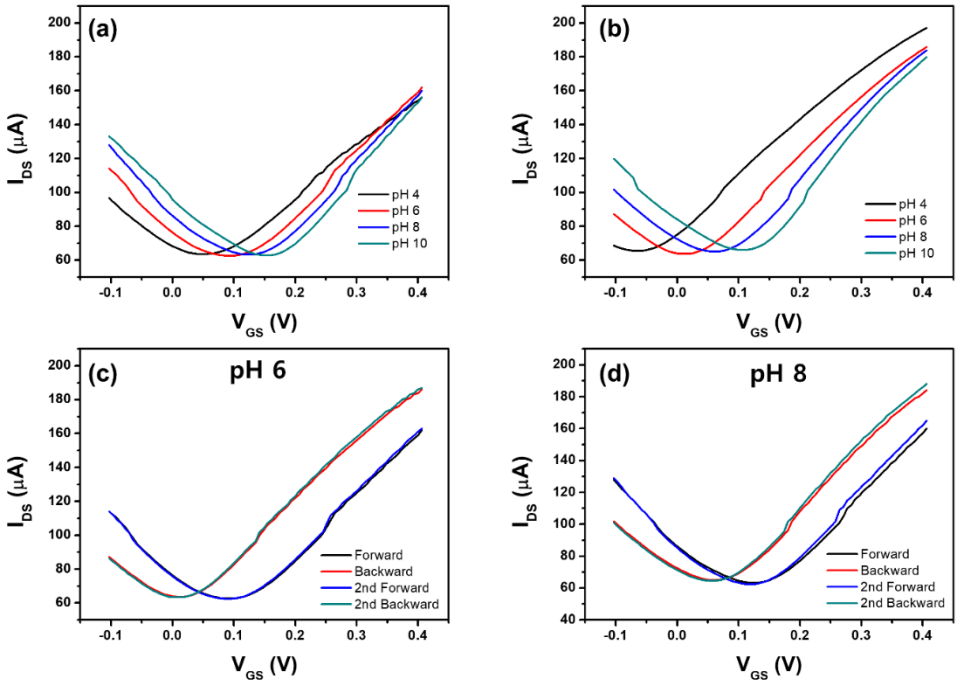

Figure 1. The I_{DS}-V_{GS} transfer characteristic of G-ISFET according to forward and backward gate bias (-0.1 to 0.4). (a) The I_{DS}-V_{GS} transfer characteristic with pH value with the forward and (b) backward gate bias. (c) The I_{DS}-V_{GS} transfer characteristic of G-ISFET with forward and backward bias at pH 6 and (d) pH 8.

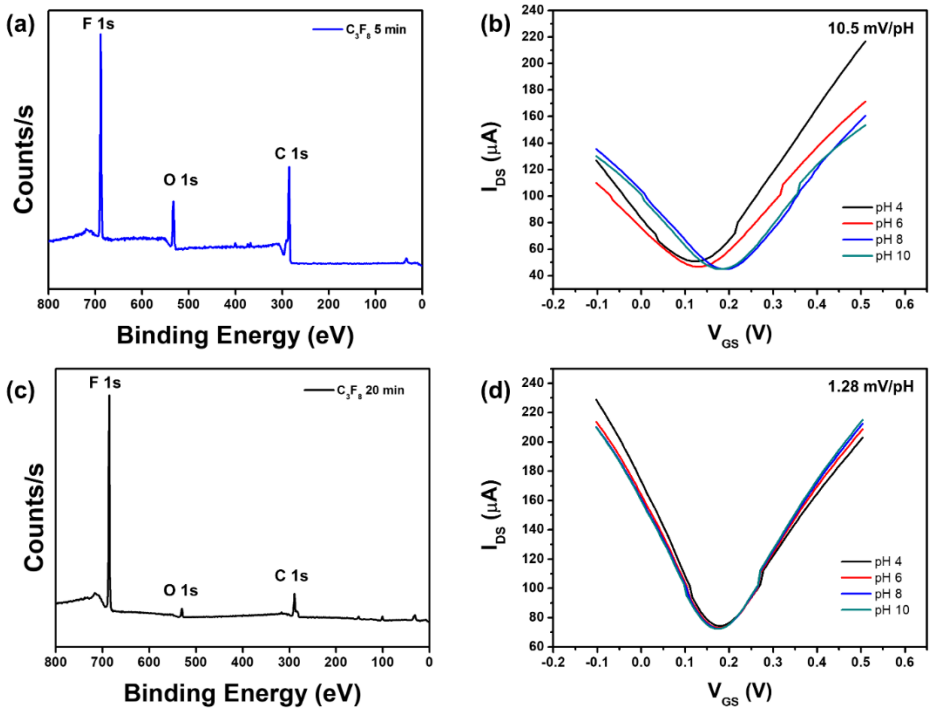

Figure S2 The XPS spectra and I_{DS}-V_{GS} transfer characteristic of fluorinated graphene due to increase plasma time. As the plasma time increased (5 min, 20 min), the fluorine atomic ratio of fluorinated graphene was increased ((a) 28.7% and (c) 49.85%). However, the pH sensitivity of fluorinated graphene was decreased ((b) 10.5 and (d) 1.28 mV/pH) according to the plasma time.

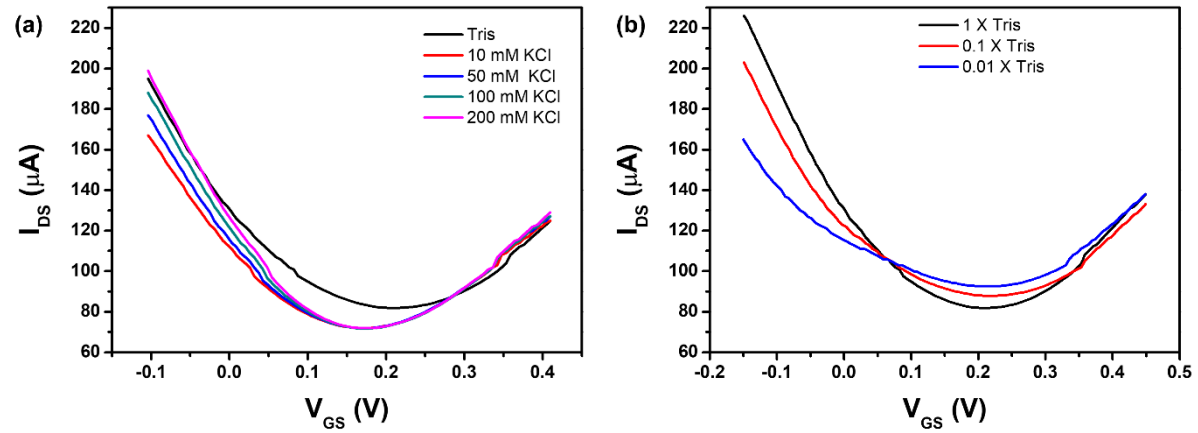

Figure S3. The I_{DS}-V_{GS} transfer characteristic of fluorinated graphene (FG) due to the anion concentration and ionic strength. (a) The I_{DS}-V_{GS} transfer characteristic of fluorinated graphene due to different concentration of KCl solution. (b) The The I_{DS}-V_{GS} transfer characteristic of fluorinated graphene due to different ionic concentration of Tris-HCl solution.

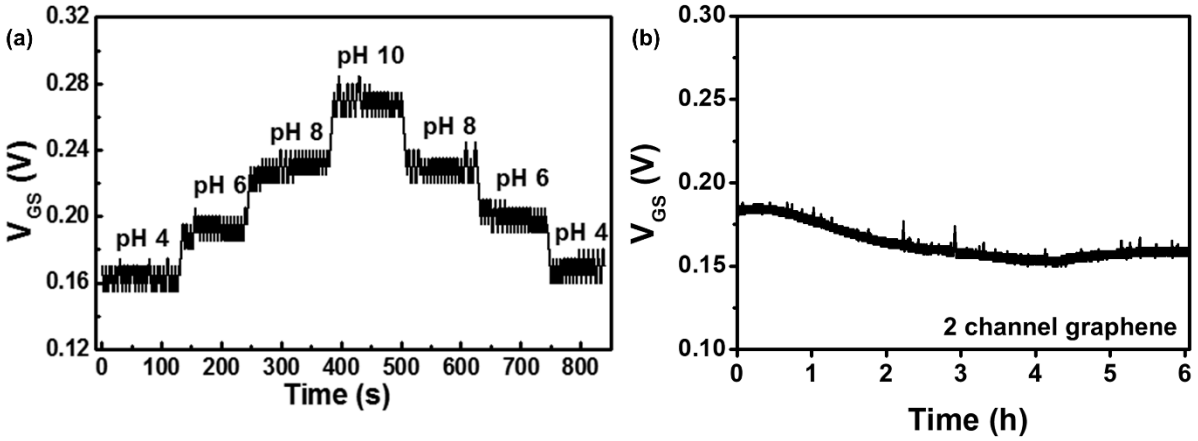

Figure S4. Real-time detection of pH in electrolyte solution using the two-channel G-SGFET. (a) The hysteresis characteristics of the two-channel G-SGFET from pH 4–10–4. (b) The stability of the two-channel G-SGFET in a buffer solution of pH 8 for 6 h (V_{DS} = 0.05V, I_{DS} = 130 μA).