

## Supplementary Materials

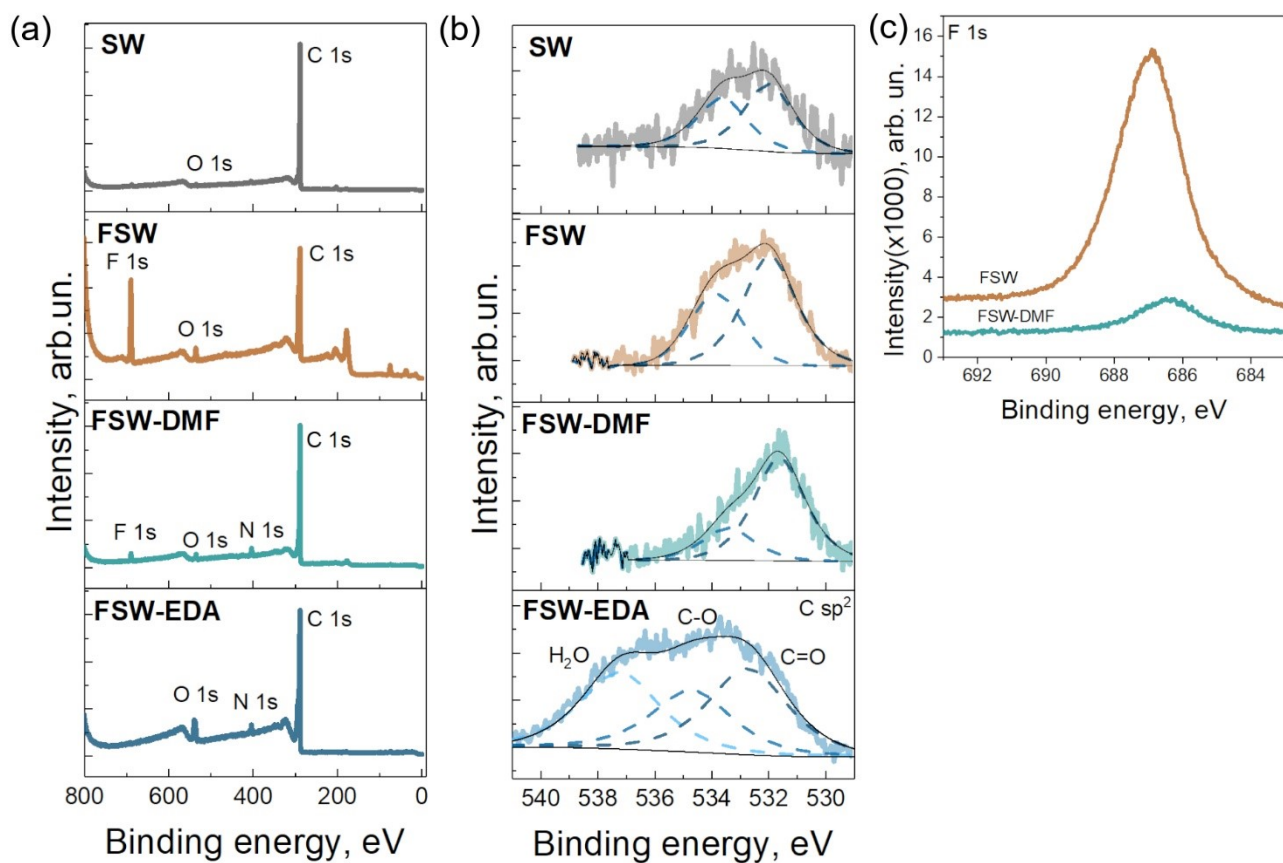
# Tuning humidity sensing properties via grafting fluorine and nitrogen-containing species on single- walled carbon nanotubes

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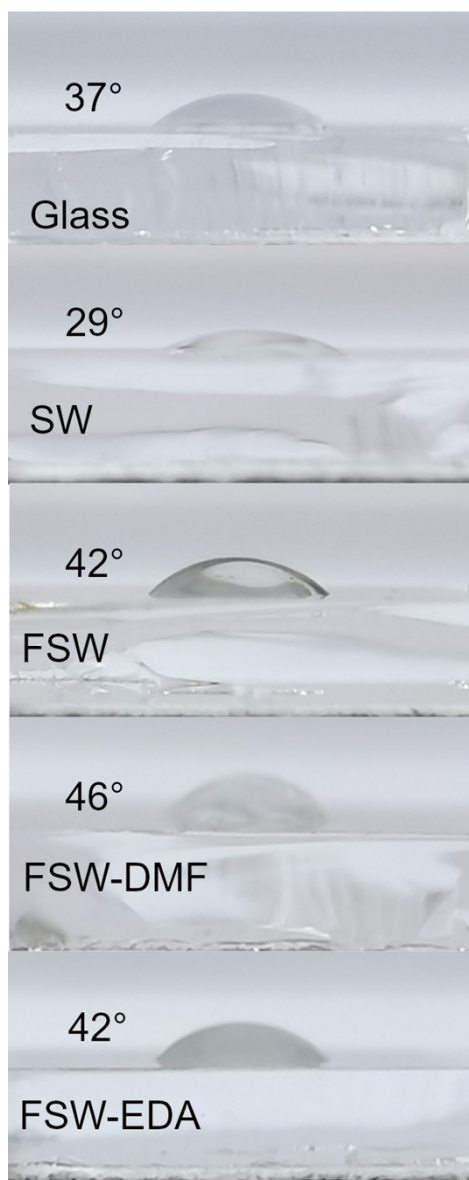
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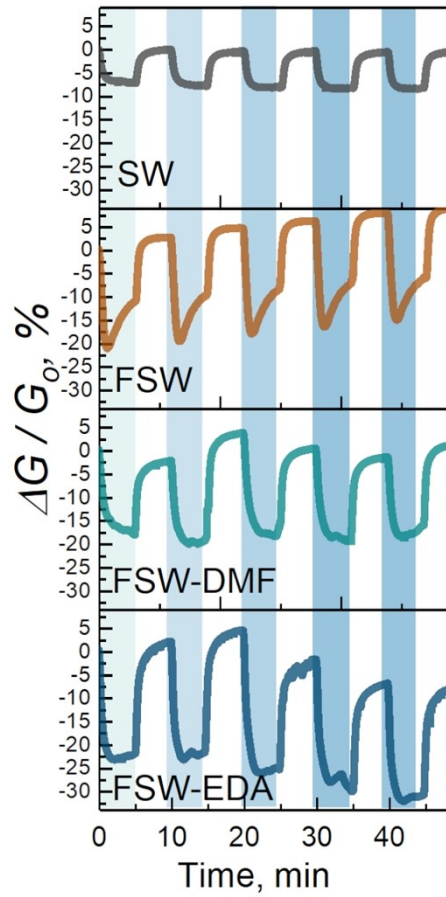
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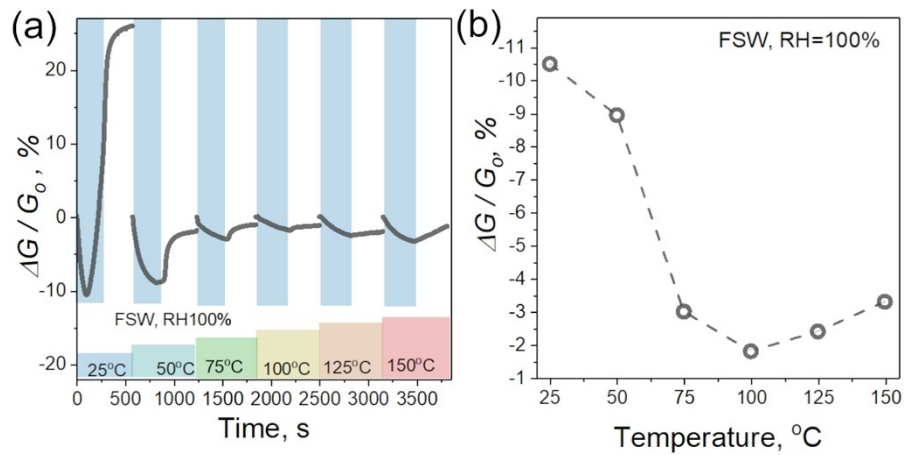
**Figure S1.** XPS (a) survey spectra and (b) O 1s spectra of initial (SW) and chemically modified SWCNTs and (c) F 1s spectra of fluorinated SWCNTs (FSW) and those treated with DMF.



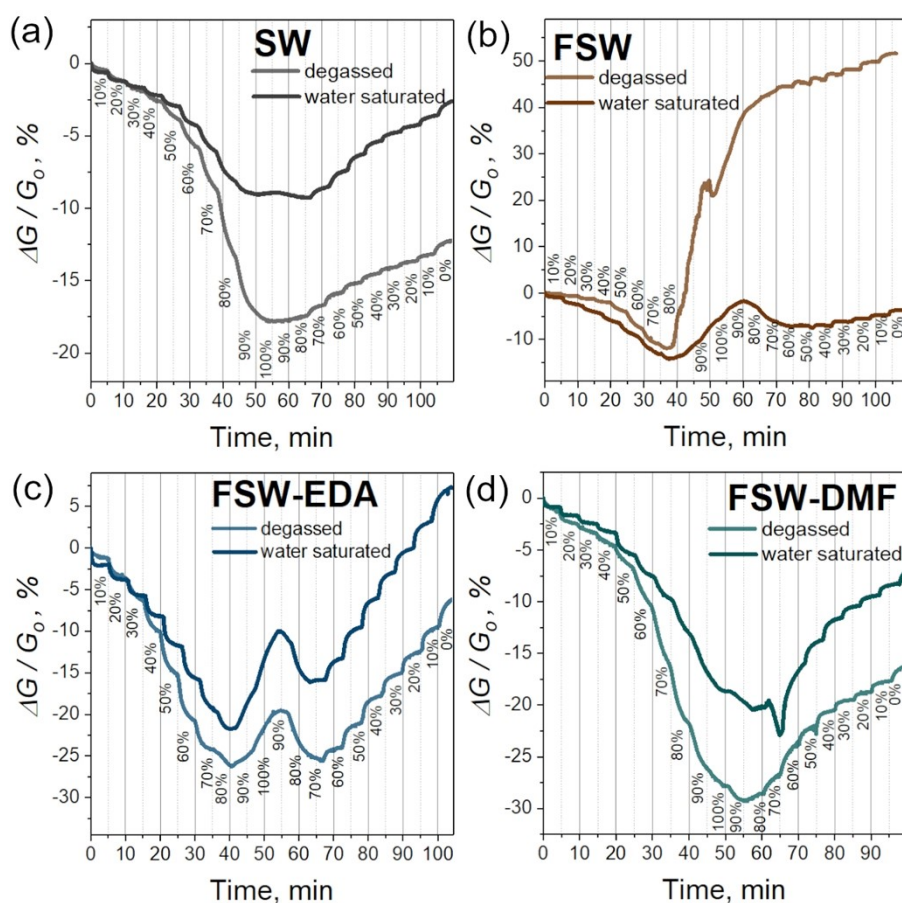
**Figure S2.** Contact angle measured at the interface between a water drop and the surface of glass substrate, SW film, FSW film, FSW-DMF film, and FSW-EDA film 120 s after droplet application.



**Figure S3.** Run-to-run tests of the sensors to humid air (RH=100%, light strip) and dry air (RH=0%, dark strip) at room temperature after initial saturation of sensor in humid atmosphere.



**Figure S4.** (a) Experimental curves of sensor response at different operation temperatures and (b)  $\Delta G / G_0$  vs temperature of FSW sensor exposed to 100% RH.



**Figure S5.** Dynamic response of (a) SW, (b) FSW, (c) FSW-EDA and (d) FSW-DMF sensors to the presence of water in air with an increase in RH from 10% to 100% and a decrease in RH from 100% to 0%. Degassed sensors are films annealed at 150 °C in argon; water-saturated sensors are obtained after testing the films at 100% RH followed by treatment with dry air at room temperature.