Supplementary Information

Highly selective and sensitive chemoresistive humidity sensors based on rGO/MoS_2 van der Waals composites †

Seo Yun Park [‡a] Yeon Hoo Kim,[a] Seon Yong Lee,[a] Woonbae Sohn,[a] Jung Eun Lee,[b] Do Hong Kim,[c] Young-Seok Shim,[d] Ki Chang Kwon,[a, e] Kyoung Soon Choi,[f] Hee Joun Yoo,[g] Jun Min Suh,[a] Museok Ko,[h] Jong-Heun Lee,[c] Mi Jung Lee,[h] Soo Young Kim,[e] Min Hyung Lee,[, b] and Ho Won Jang[*,a]*

a. Department of Materials Science and Engineering, Research Institute of Advanced Materials, Seoul National University, Seoul 08826, Republic of Korea. E-mail: hwjang@snu.ac.kr

b. Department of Applied Chemistry, Kyung Hee University, Yongin, Gyeonggi 17104, Republic of Korea. E-mail: minhlee@khu.ac.kr

c. Department of Materials Science and Engineering, Korea University, Seoul 02841, Republic of Korea

d. Center for Electronic Materials, Korea Institute of Science and Technology (KIST), Seoul 02792, Republic of Korea

e. School of Chemical Engineering and Materials Science, Chung-Ang University, Seoul 06974, Republic of Korea

f. Advanced Nano-Surface Research Group, Korea Basic Science Institute (KBSI), Daejeon 34133, Republic of Korea

g. GRAPHENEALL, #504, 1ra, 127gil, Okkucheon seoro, Siheung-si, Gyeonggi-do, Republic of Korea

h. *School of Advanced Materials Engineering, Kookmin University, Seoul 02702, Republic of Korea*

*Corresponding author: minhlee@khu.ac.kr, hwjang@snu.ac.kr

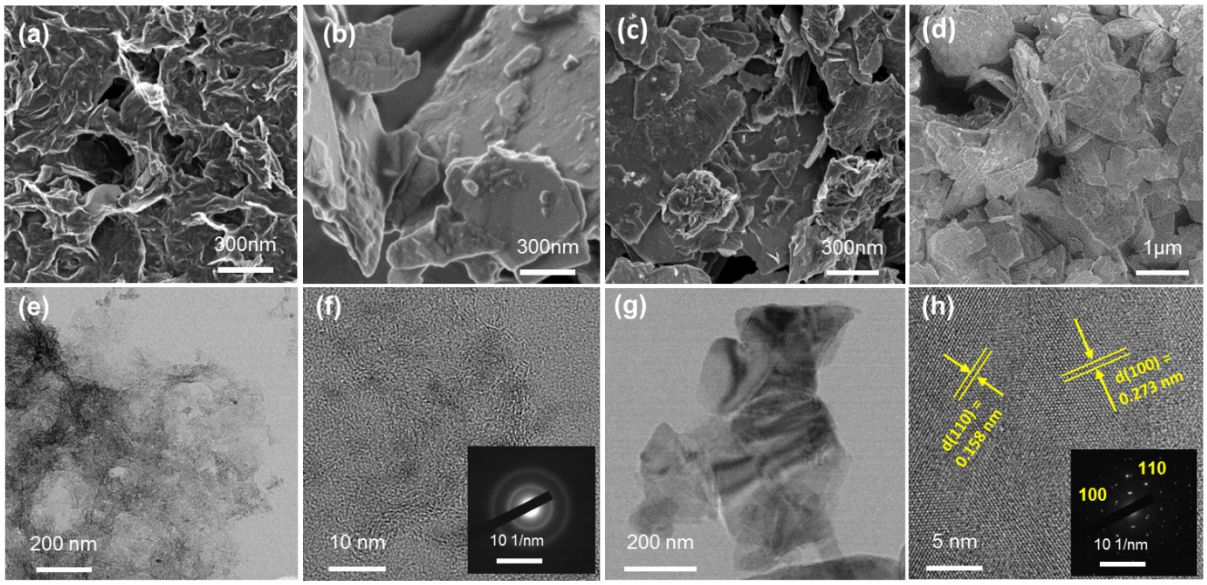

Figure S1. SEM images of (a) rGO, (b) MoS_2, (c) RGMS 1 and (b) RGMS 10. And TEM images of (e) rGO and high-magnification TEM image of rGO. TEM image of (e) MoS_2 and (h) high-magnification TEM image of MoS_2.

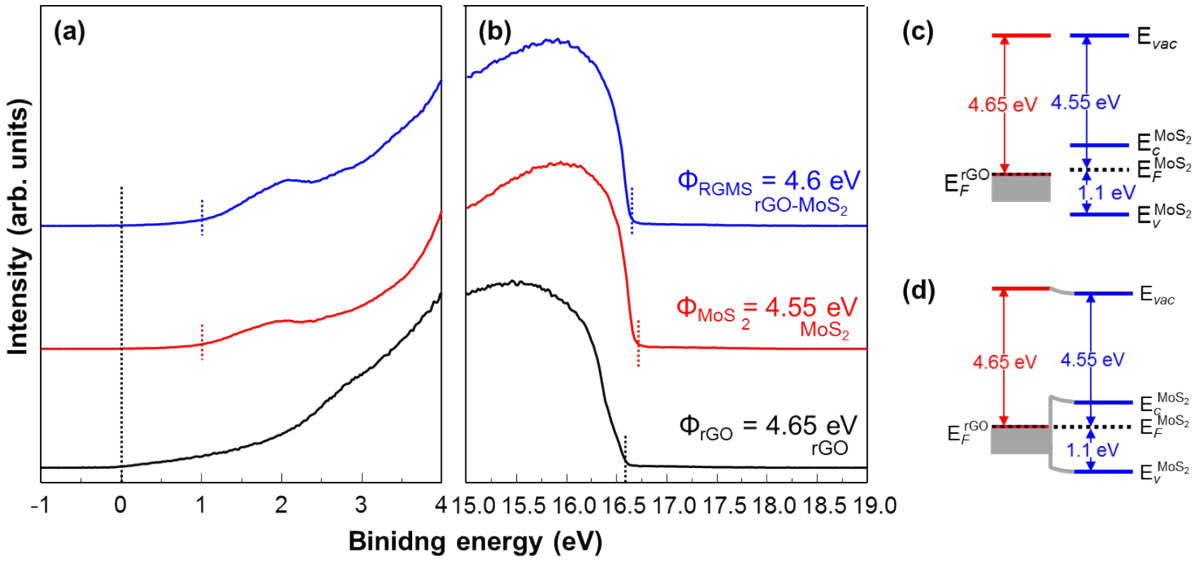

Figure S2. UPS spectra of MoS_2, rGO and RGMS. (a) HOMO and (b) the secondary electron cutoff. Band diagram of RGMS heterojunction at (a) flat band condition and (d) equilibration of Fermi.

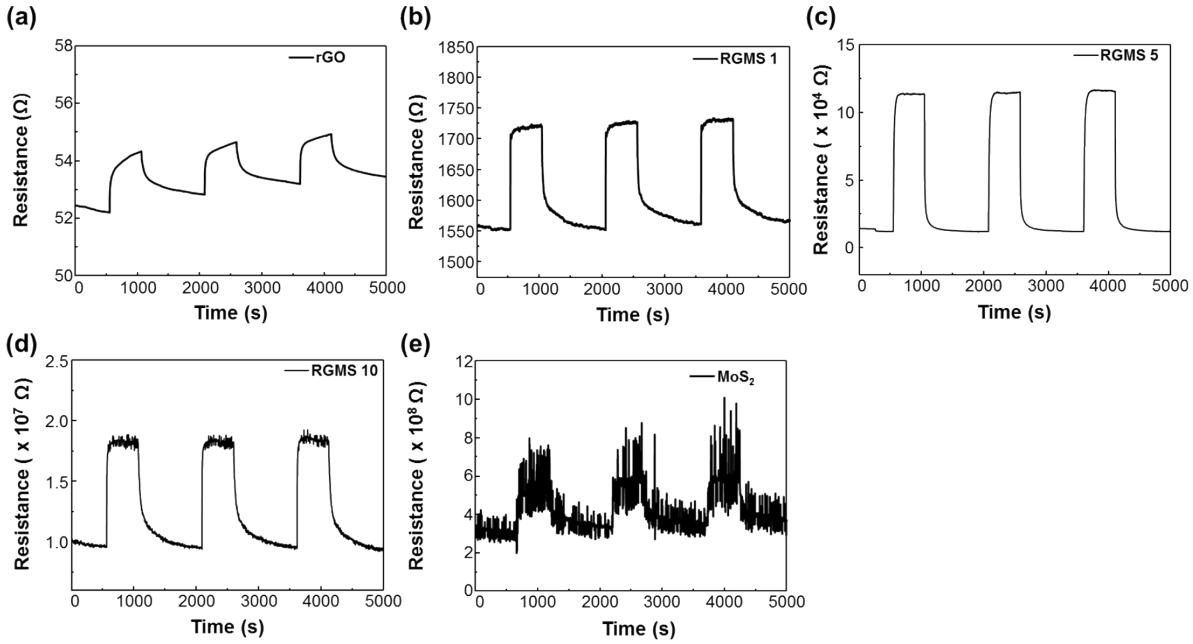

Figure S3. Response curves of (a) pristine rGO, (b) RGMS 1, (c) RGMS 5, (d) RGMS 10 and (e) pristine MoS_2 to three pulses of 50% RH at room temperature.

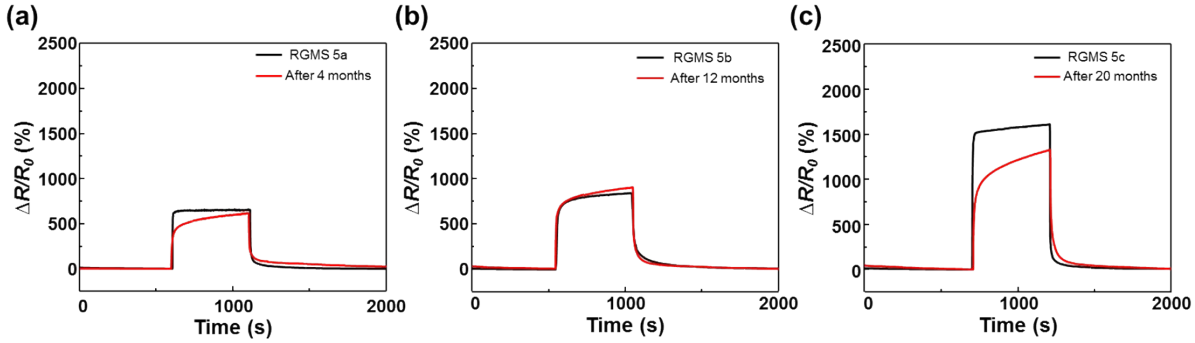

Figure S4. (a) Response curves of just fabricated RGMS 5a and after 4 months. (b) Response curves of just fabricated RGMS 5b and after 12 months. (c) Response curves of just fabricated RGMS 5c and after 20 months.

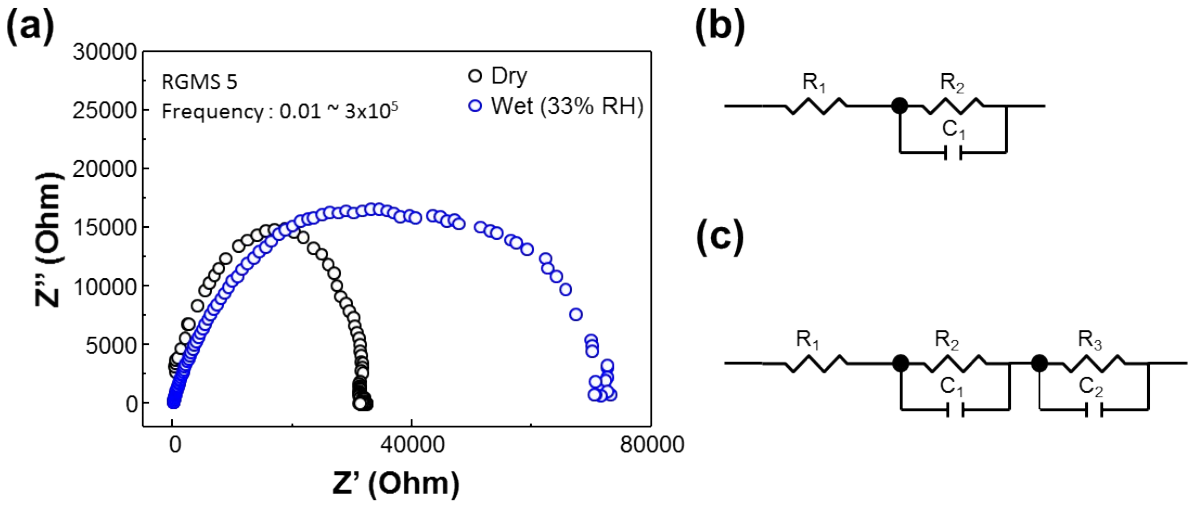

Figure S5. (a) Nyquist plots of RGMS 5 in dry air and wet air condition. Equivalent circuits of RGMS 5 under (b) dry air condition and (c) humid condition.

Video S1. The fabrication process of RGMS based humidity sensor.