

Supporting Information

Fabrication of Highly Conductive Graphene/Textile Hybrid Electrode via Hot Pressing and its Application as a Piezoresistive Pressure Sensor

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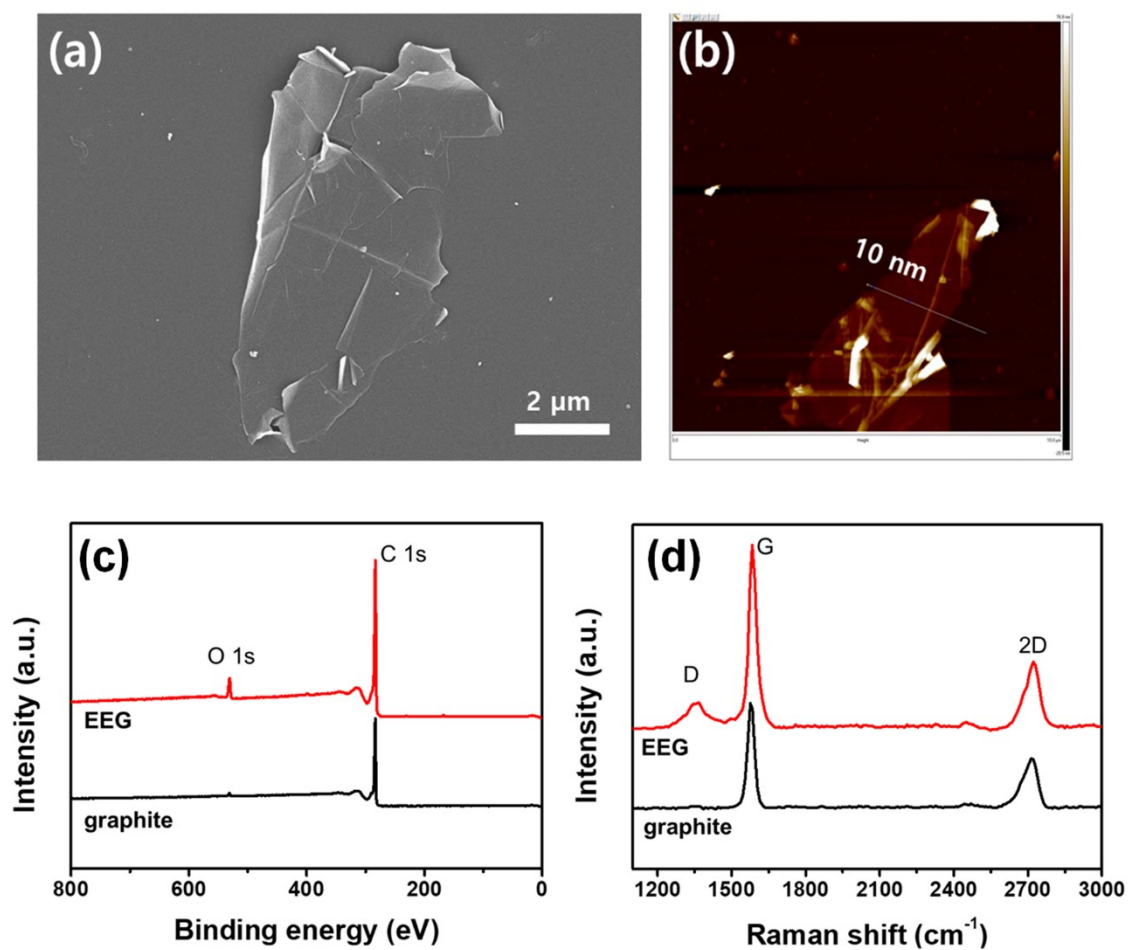


Figure S1. (a) SEM and AFM images of EEG on silicon substrate. (c) XPS and (d) Raman spectra of EEG and graphite.

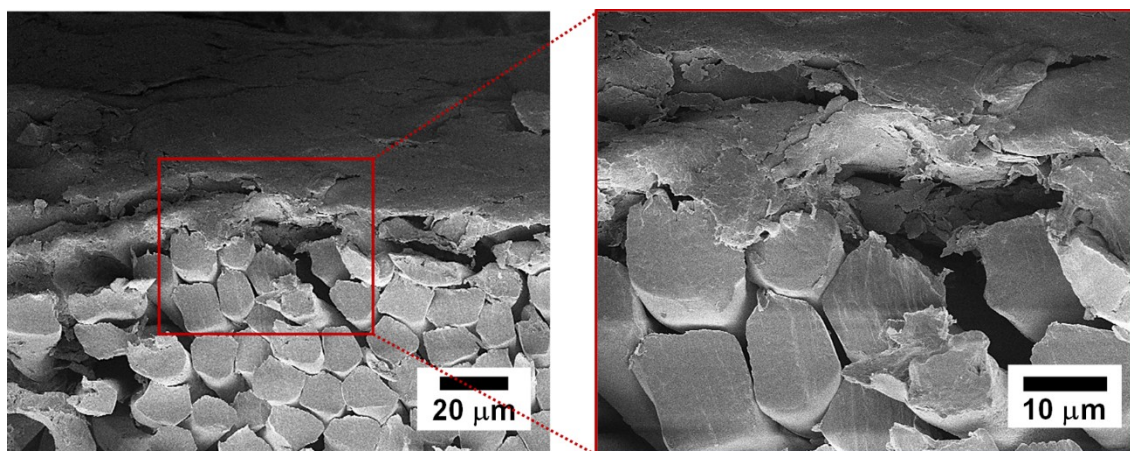


Figure S2. Magnified SEM images of interface between EEG film and the textile surface.

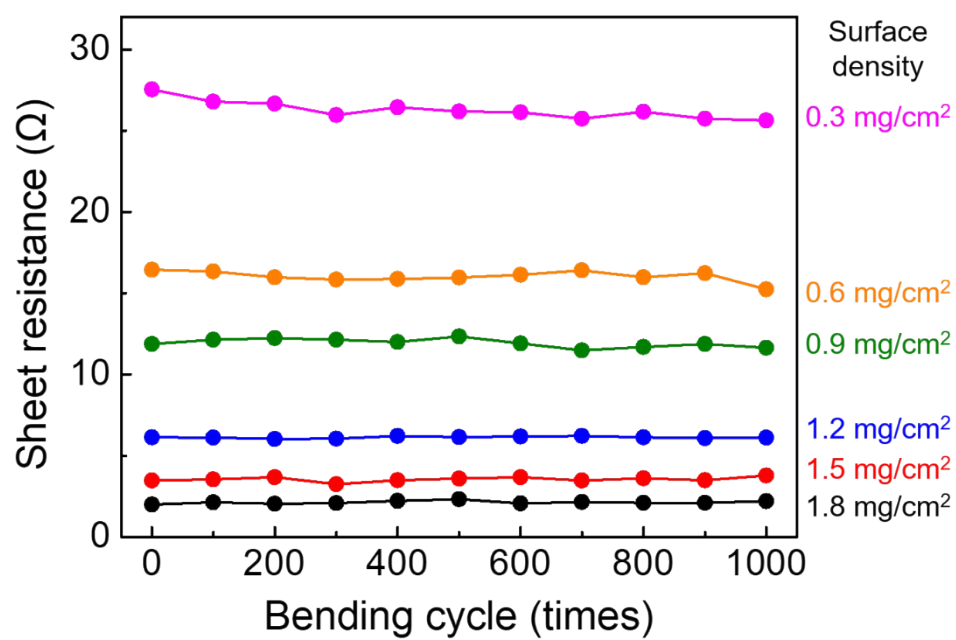
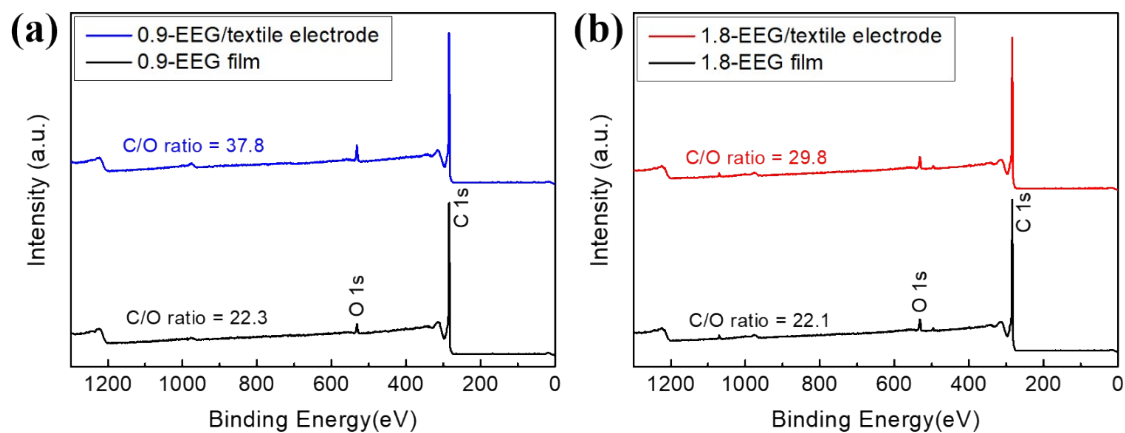


Figure S3. Changes in the sheet resistance of EEG/textile electrodes with different surface densities of the EEG film on the textile ($0.3\text{--}1.8\text{ mg cm}^{-2}$), depending on the bending cycles (under a bending radius of 0.75 cm).



Sample	C (%)	O (%)	C/O ratio
0.9-EEG film	94.85	4.25	22.3
0.9-EEG/textile electrode	96.77	2.56	37.8
1.8-EEG film	94.32	4.27	22.1
1.8-EEG/textile electrode	95.32	3.20	29.8

Figure S4. Wide-scan XPS spectra of (a) 0.9-EEG film and 0.9-EEG/textile electrode, (b) 1.8-EEG film and 1.8-EEG/textile electrode. The table shows C and O atomic percentage and C/O ratio of each sample.

To identify the effect of the hot pressing technique on the surface roughness of the textile substrate, we performed SEM and Alpha-Step analyses of the cotton textile after removing the EEG films. Since the EEG films with surface densities higher than 1.8 mg cm^{-2} became separated from the cotton textile when bending the EEG/textile electrode several times, we could analyze the surface state of the textile substrate after hot pressing with the EEG films. As shown in SEM image, some graphene clusters remain (blue circles in SEM image), but the shape of the cotton textile does not change significantly after removing the EEG films. Furthermore, RMS roughness (R_q) decreases slightly from $11.0 \text{ }\mu\text{m}$ for the bare textile to $10.18 \text{ }\mu\text{m}$ for the textile after removing the EEG films, which may be attributed to the deformation of textile form by hot pressing and remaining graphene clusters. Therefore, it is confirmed that the hot pressing technique does not significantly change the surface roughness and morphology of the textile substrate.

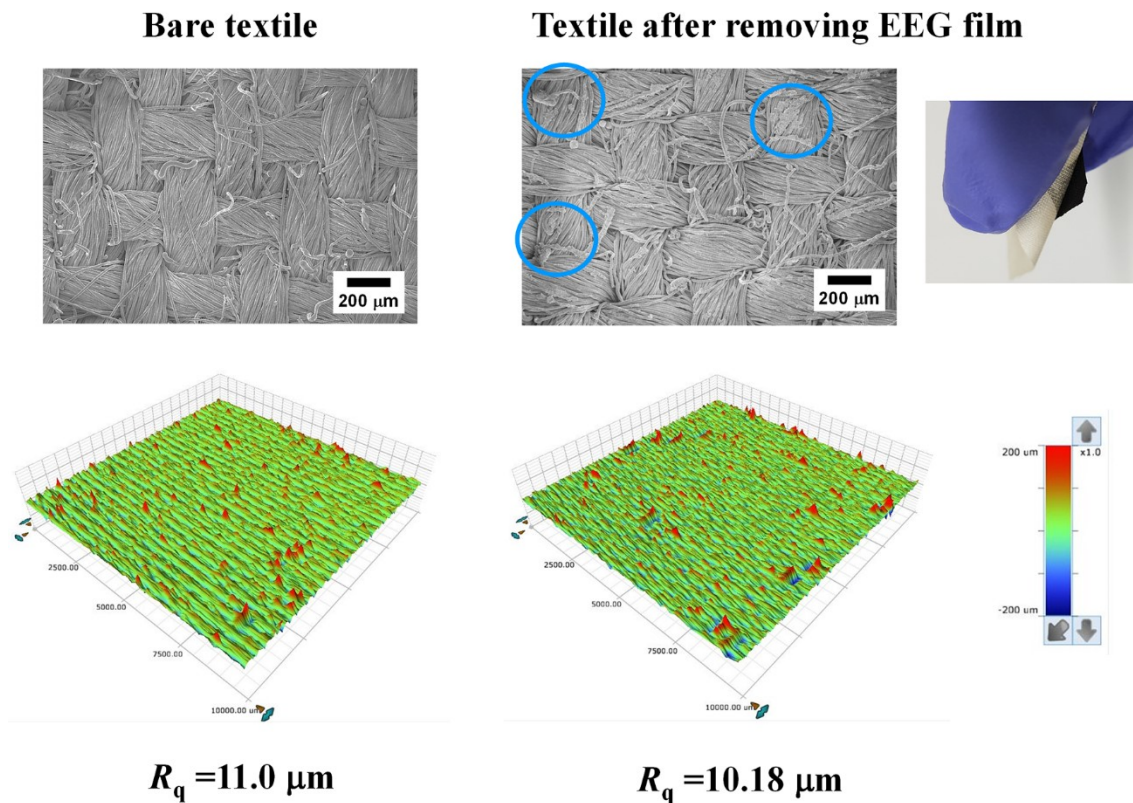


Figure S5. SEM and Surface-3D profile images of the bare textile and textile substrate after removing the EEG film. The RMS roughness is shown at the bottom.

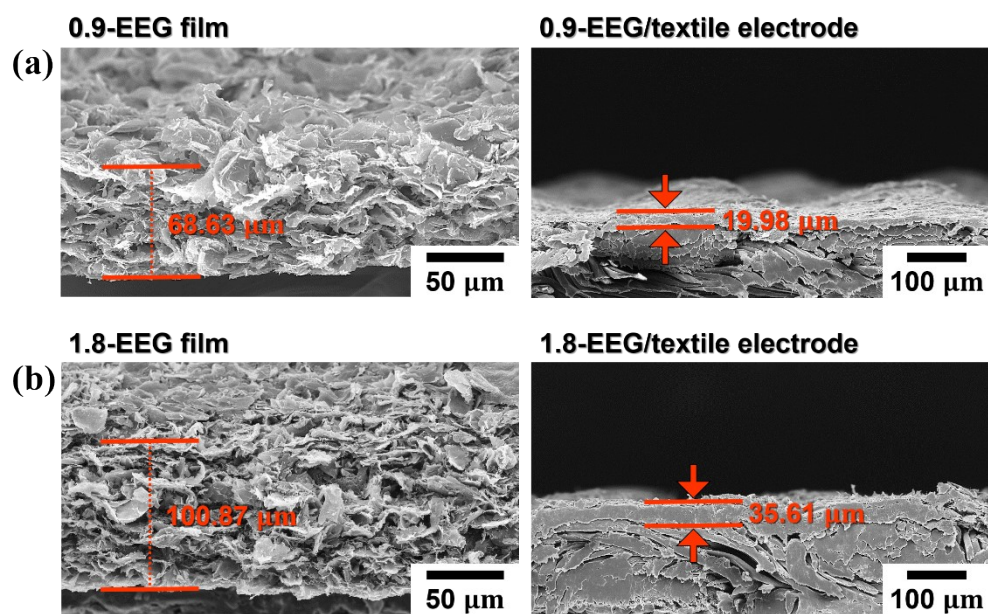


Figure S6. SEM images of (a) 0.9-EEG film and 0.9-EEG/textile electrode and of (b) 1.8-EEG film and 1.8-EEG/textile electrode.

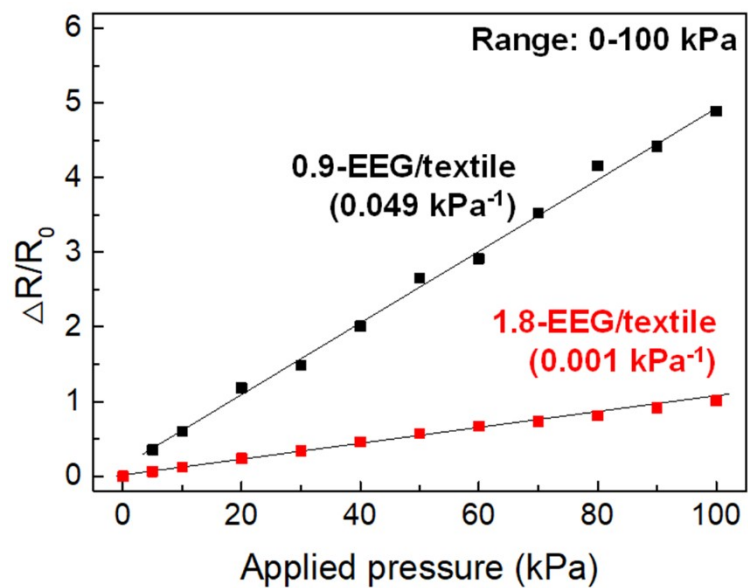


Figure S7. Change in $\Delta R/R_0$ of the pressure sensors as a function of the applied pressure of 0-100 kPa.

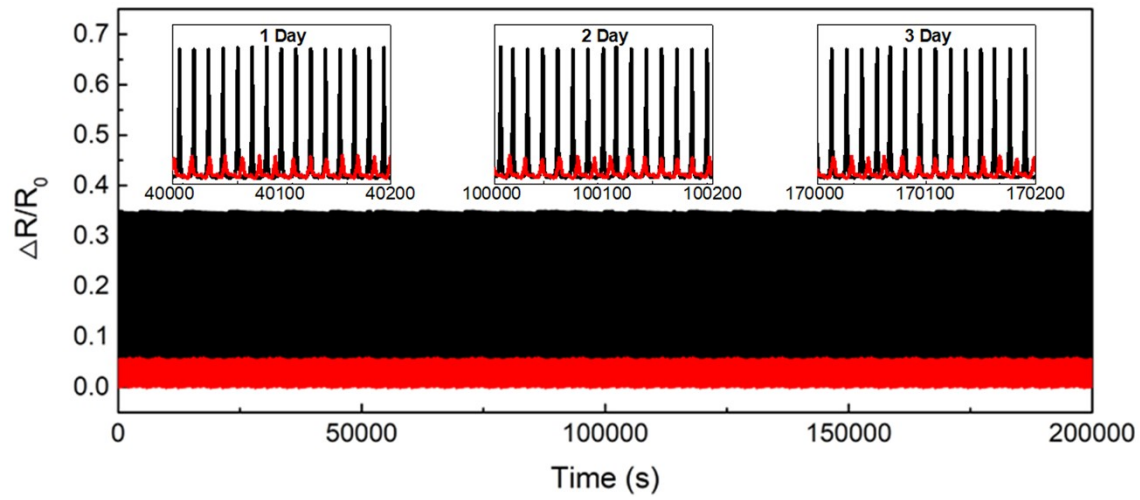


Figure S8. Change in $\Delta R/R_0$ of the sensors over 10,000 loading and unloading cycles with a maximum pressure of 5.0 kPa. The top insets show magnified graphs measured on the first, second, and third days.

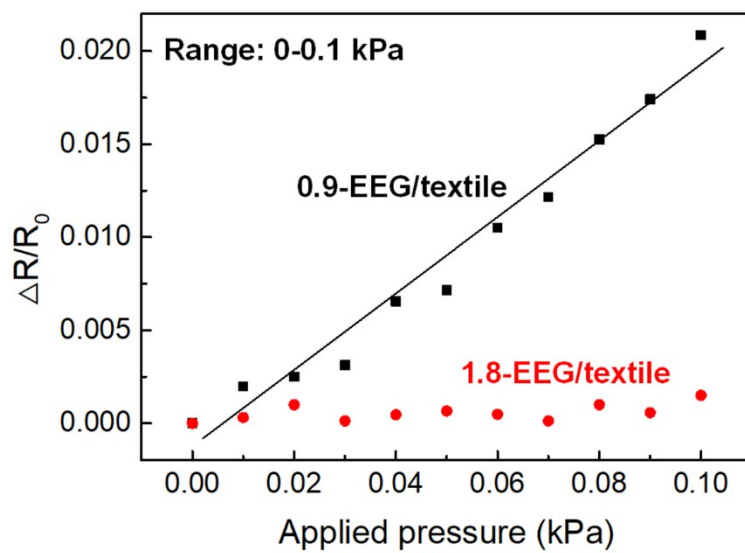


Figure S9. Change in $\Delta R/R_0$ of the pressure sensors as a function of the applied pressure of 0-100 Pa.

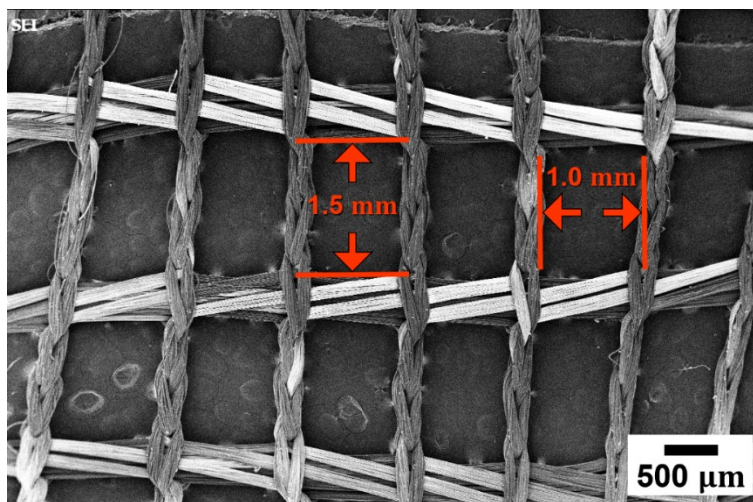


Figure S10. SEM image of the polyester fabric with a mesh pattern and opening width of 1.5 mm and length of 1.0 mm.