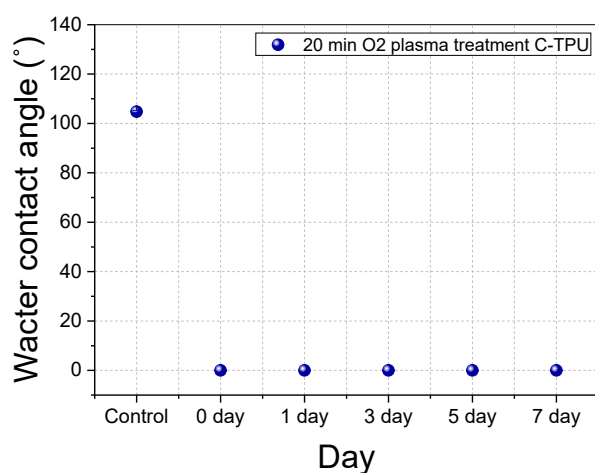


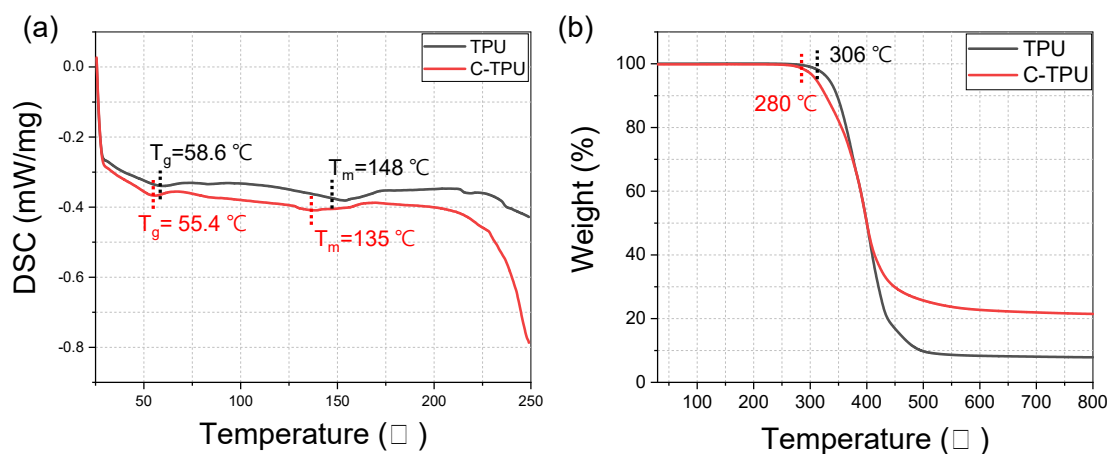
## Supporting Information

### Wearable Colorimetric Sweat pH Sensor-based Smart Textile for Health State Diagnosis

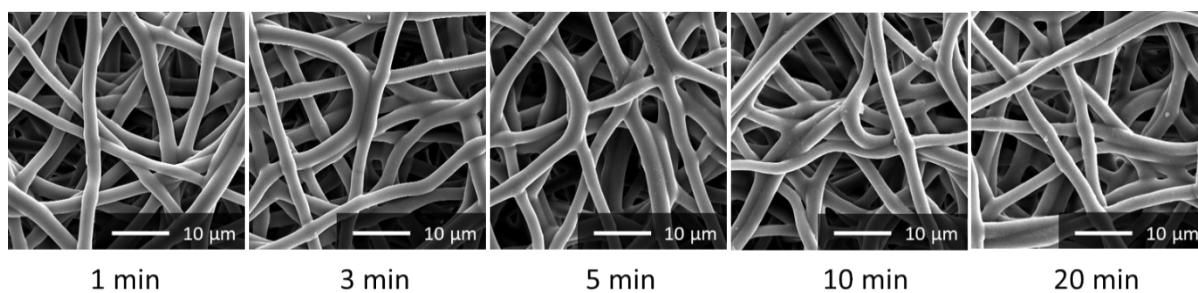
Ji-Hwan Ha,<sup>a,b</sup> Yongrok Jeong,<sup>a,b</sup> Junseong Ahn,<sup>a,b</sup> Soonhyong Hwang,<sup>b</sup> Sohee Jeon,<sup>b</sup> Dahong Kim,<sup>c</sup> Jiwoo Ko,<sup>a,b</sup> Byeongmin Kang,<sup>a,b</sup> Young Jung,<sup>a</sup> Junrak Choi,<sup>a</sup> Hyeonseok Han,<sup>a</sup> Jimin Gu,<sup>a</sup> Seokjoo Cho,<sup>a</sup> Hyunjin Kim,<sup>a</sup> Moonjeong Bok,<sup>b</sup> Su A Park,<sup>d</sup> Jun-Ho Jeong<sup>b,\*</sup> and Inkyu Park<sup>a,\*</sup>



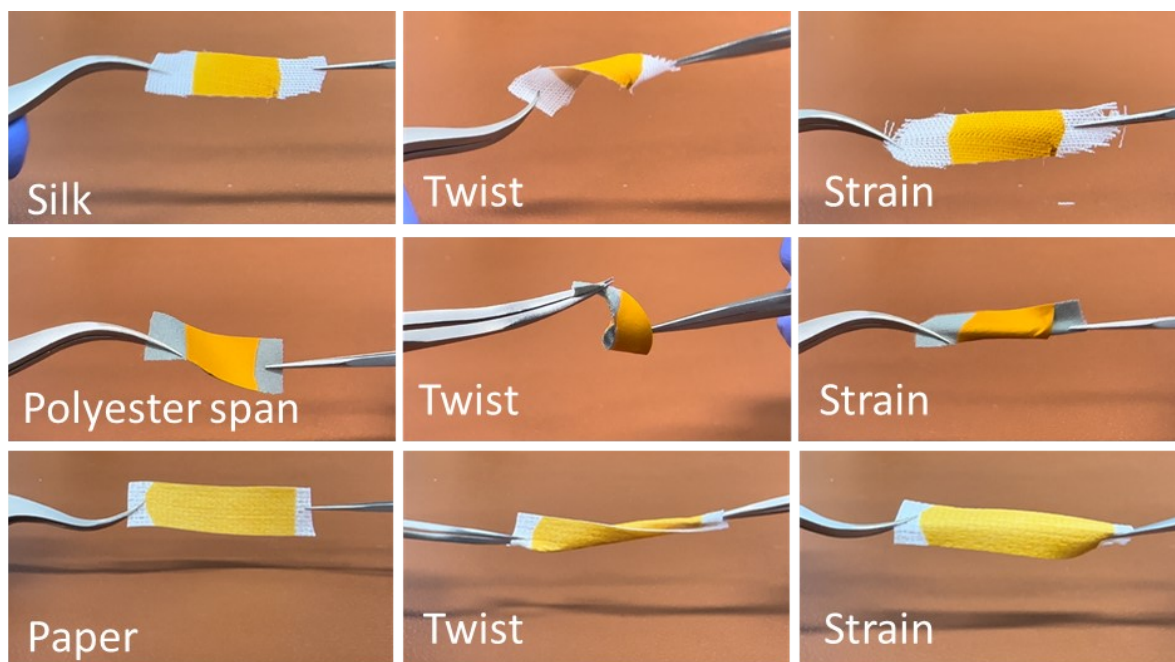
**Figure S1.** Water contact angle (WCA) of C-TPU according to the time laps. The WCA of O<sub>2</sub> plasma treated C-TPU (20 min) are maintained 0° after 7 days. (Control: Non-O<sub>2</sub> plasma treated C-TPU)



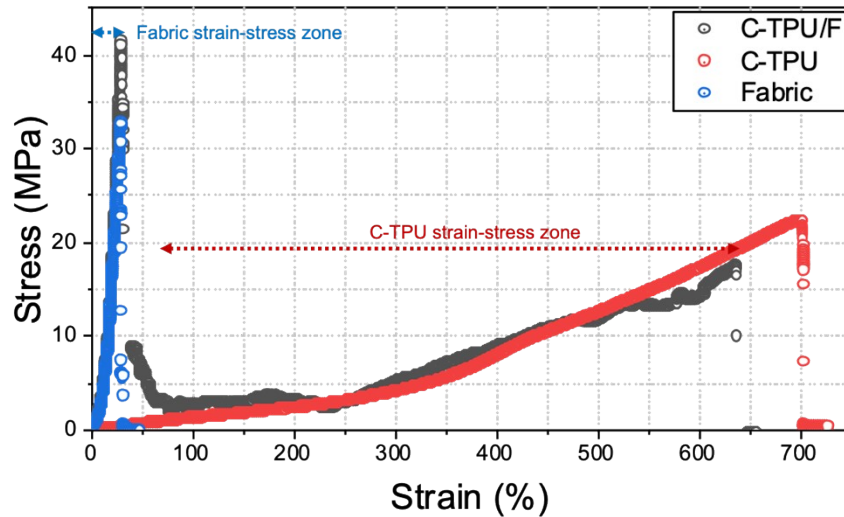
**Figure S2.** (a) DSC analysis results of TPU and C-TPU. The glass transition temperatures of TPU and C-TPU are measured to be 58.6 °C and 55.4 °C, respectively. (b) The TGA results of TPU and C-TPU. TPU and C-TPU exhibit thermal degradation starting at 280 °C and 306 °C, respectively.



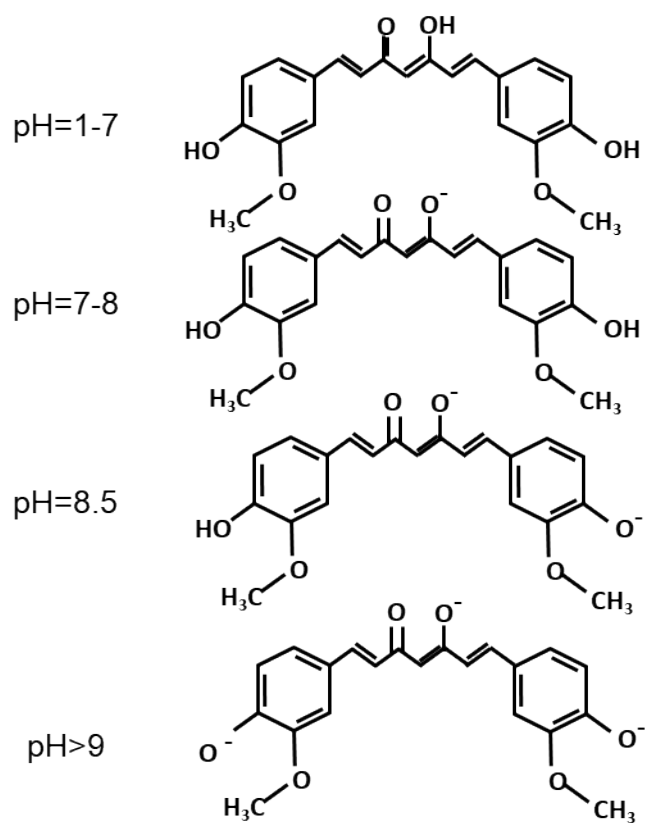
**Figure S3.** SEM images of C-TPU fiber morphologies according to O<sub>2</sub> plasma treatment period (1 min ~ 20 min). The morphological damages of these fibers are not caused by plasma treatment for up to 20 min.



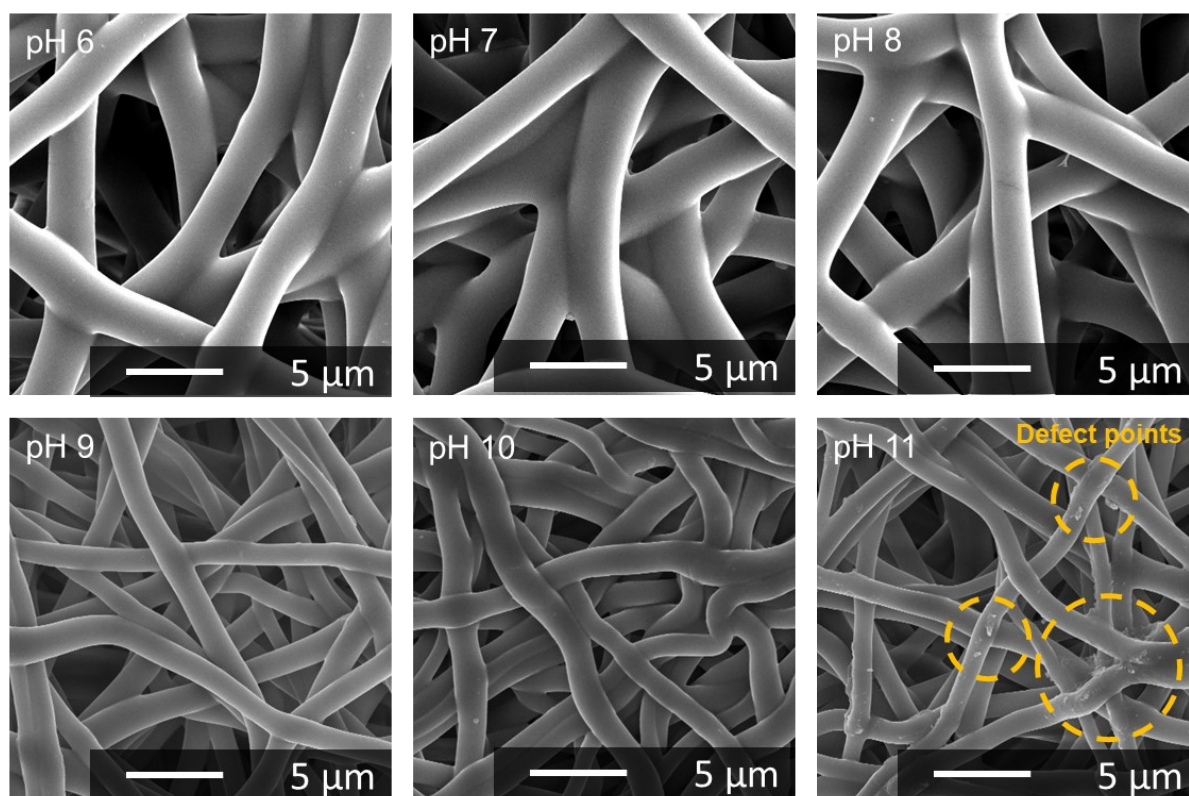
**Figure S4.** Flexibility and stretchability of C-TPU with various fabrics such as silk, polyester span, and paper (plasma treatment time: 20 min). The strain and twist motions are conducted.



**Figure S5.** Mechanical properties of fabric (cotton 100%), C-TPU and C-TPU/F. Here, the fabric and C-TPU samples were not treated by O<sub>2</sub> plasma. In case of C-TPU/F sample, both C-TPU and fabric were treated by O<sub>2</sub> plasma and attached using thermal pressing machine. The maximum stresses of fabric, C-TPU, and C-TPU/F are 32.5 MPa, 22.5 MPa, and 41.4 MPa, respectively. The Young's modulus of fabric and C-TPU are 0.22 MPa and 0.02 MPa, respectively. During the tensile test of C-TPU/F sample, the fabric was broken first at a maximum strain of 30 %, followed by the failure of C-TPU fiber at much higher strain (640%).



**Figure S6.** Chemical structure of curcumin according to pH conditions. The chemical structure changes of curcumin cause the changes in the light reflection and absorption.

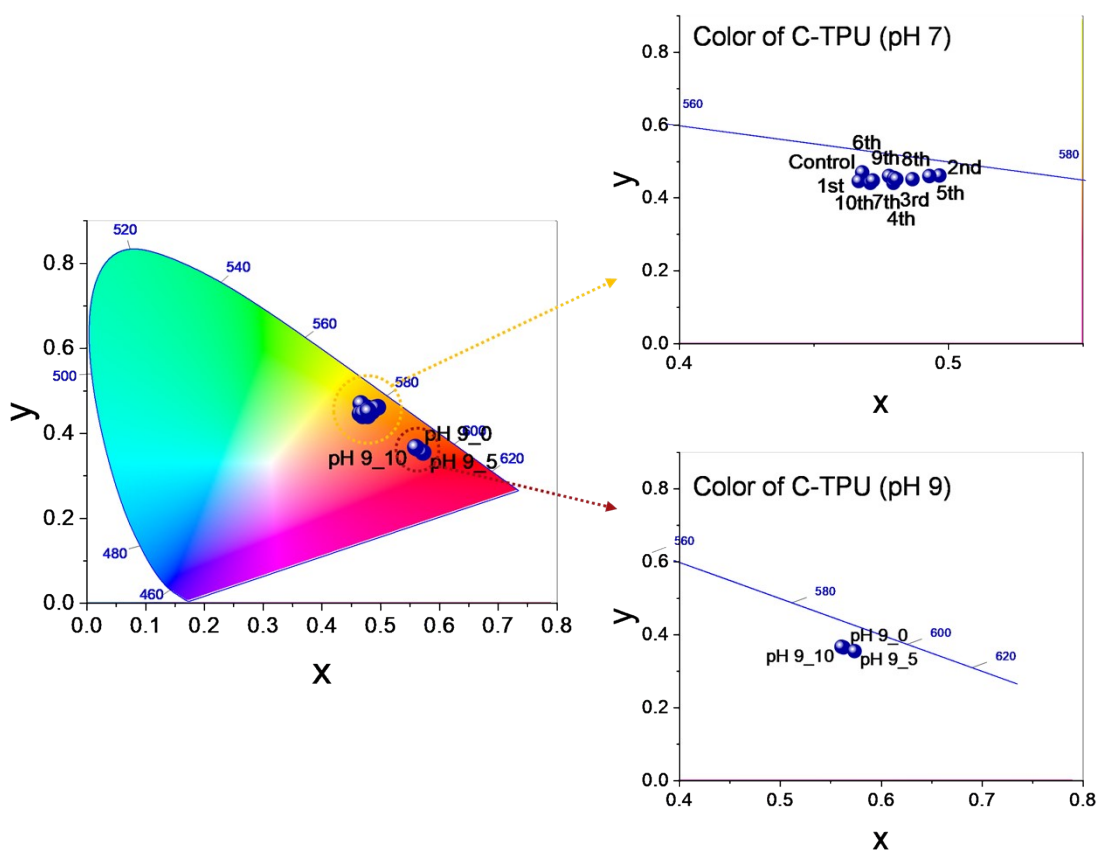


**Figure S7.** Morphological analysis of C-TPU fibers according to pH conditions. Over pH 11 conditions, the defect points of C-TPU fibers are observed due to the solubility change of curcumin.

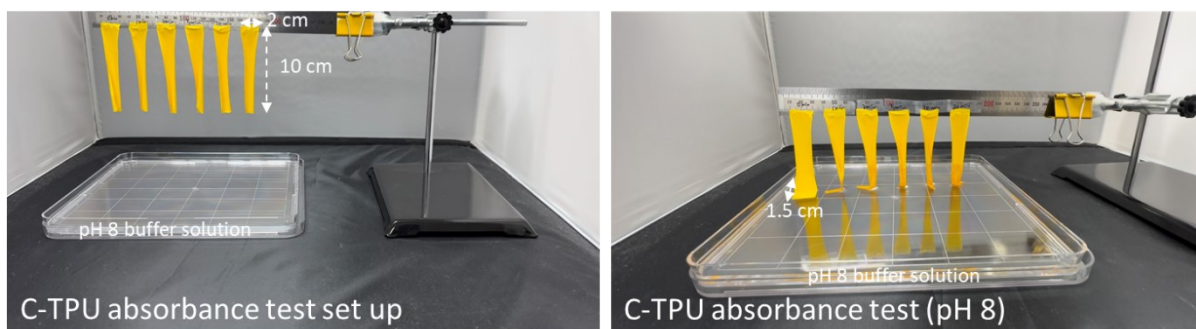


**Figure S8.** Various shapes (star, heart, clover, sun, and flower) of C-TPU applied to various fabric-based objects such as baby swaddling clothing and handkerchief. The shapes of C-TPU are made simply by cutting with scissors.





**Figure S9.** The color change of C-TPU/F based garments over the number of washes is shown in the 1931 color space. The nominal color (under pH 7) of C-TPU shows little change after a total of 10 washes. To assess the stability of colorimetric sensing of C-TPU after washing cycles, a pH 9 buffer solution was employed for samples after 0, 5, and 10 washing cycles. Consequently, the colorimetric sensing of C-TPU is found to be stable after repeated cycles of laundries with neutral detergent.



**Figure S10.** C-TPU absorbance test was conducted using pH 8 buffer solution for 3 min. The wetted surface height of C-TPU is only 1.5 cm. The O<sub>2</sub> plasma treatment time of C-TPU is 0 min, 1 min, 3 min, 5 min, 10 min, and 20 min each.