Supporting Information

a

Channel 1
$\beta=123°$
100 μm
50 μm

Channel 2
$\beta=23°$
200 μm
160 μm

Channel 3
$\beta=85°$
200 μm
150 μm

b

$$BP = -2\sigma \left[\frac{\cos\theta_1^*}{b} + \frac{\cos\theta_A}{h} \right]$$

σ : surface tension of liquid
θ_A : contact angle of the channel
θ_1^* : min$[\theta_A + \beta, 180°]$
β : diverging angle of the channel
b and h : width and height of the diverging section

c

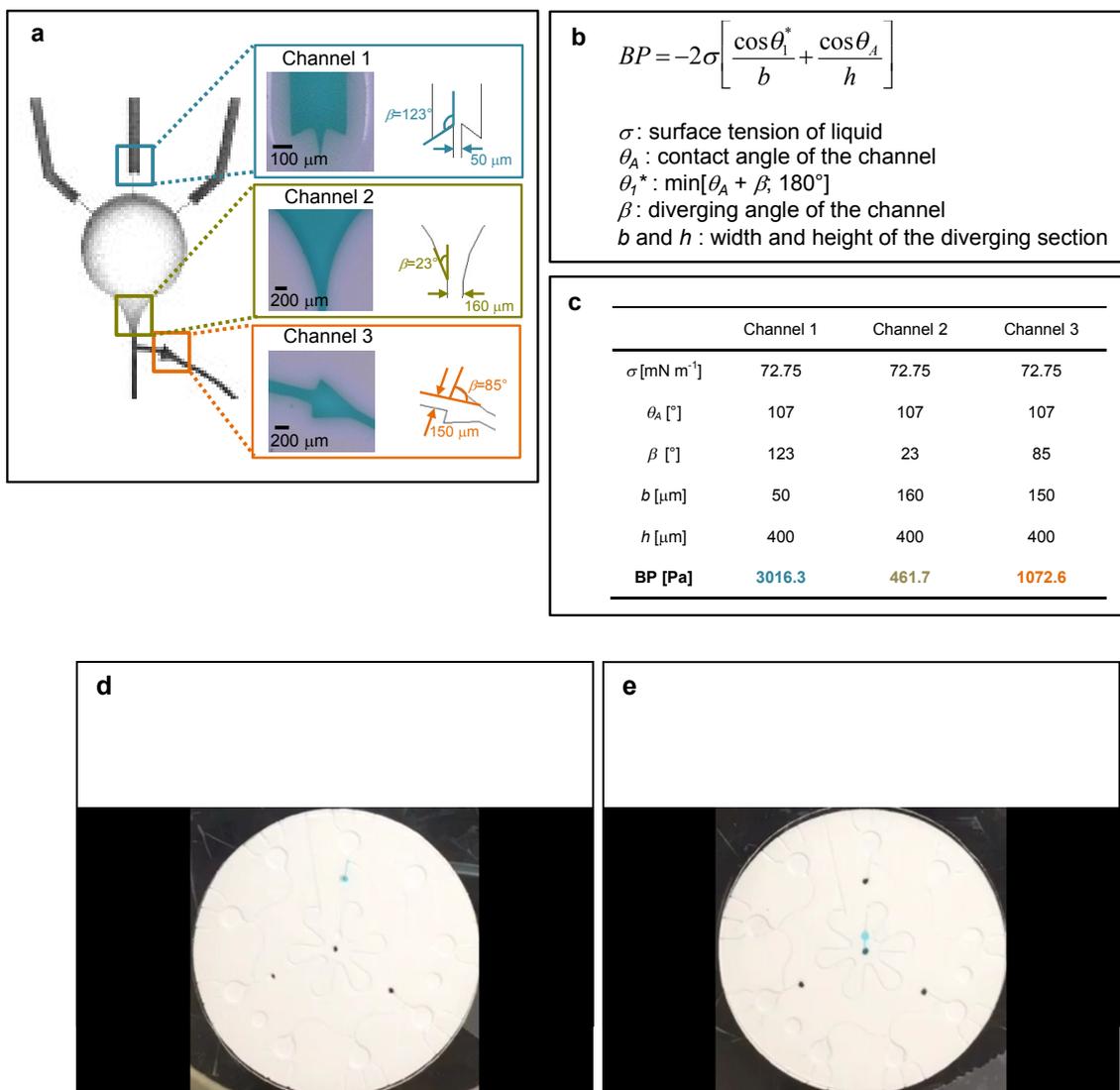|	Channel 1	Channel 2	Channel 3
σ [mN m^{-1}]	72.75	72.75	72.75
θ_A [°]	107	107	107
β [°]	123	23	85
b [μm]	50	160	150
h [μm]	400	400	400
BP [Pa]	**3016.3**	**461.7**	**1072.6**

d

e

S1 Description of the design of the micro-fluidic channel. (a) Detailed schematic illustration of a unit cell in a sweat device with a reservoir and three capillary bursting valves. (b) The Young-Laplace equation for calculating the bursting pressures (BP) of the valves. (c) Calculated BP of the three valves and the required parameters for the calculation. Movies of filling (d) the micro reservoirs and (e) the center channel.
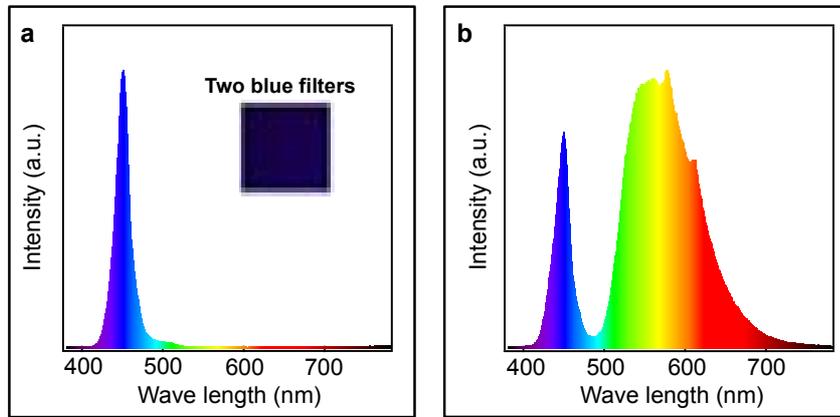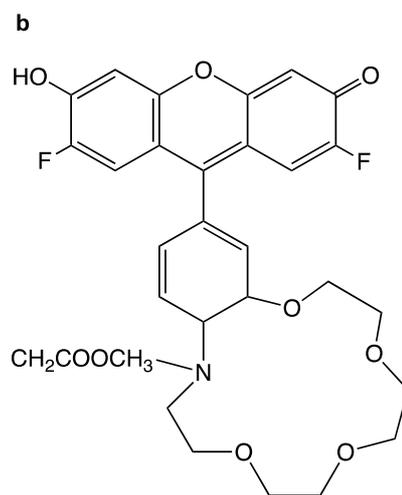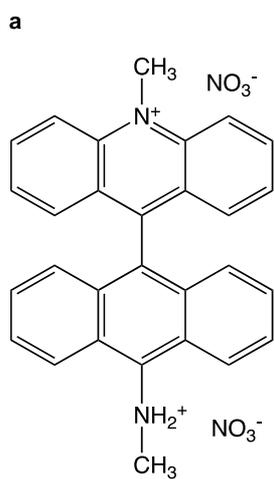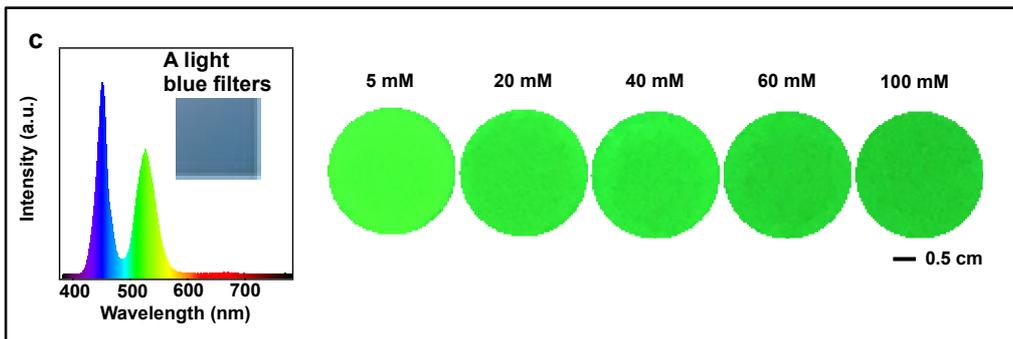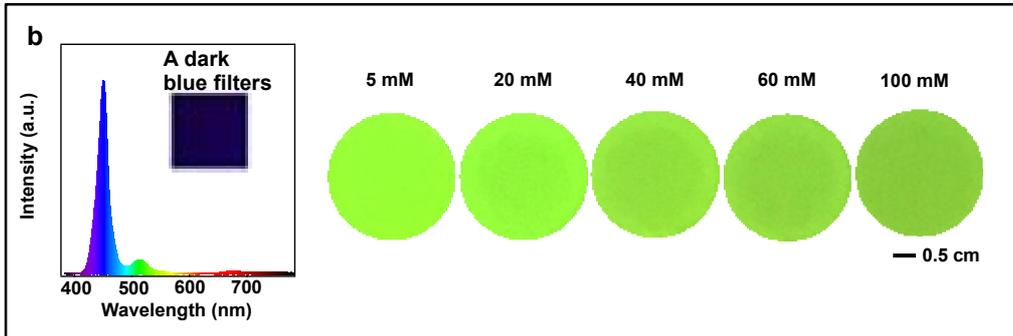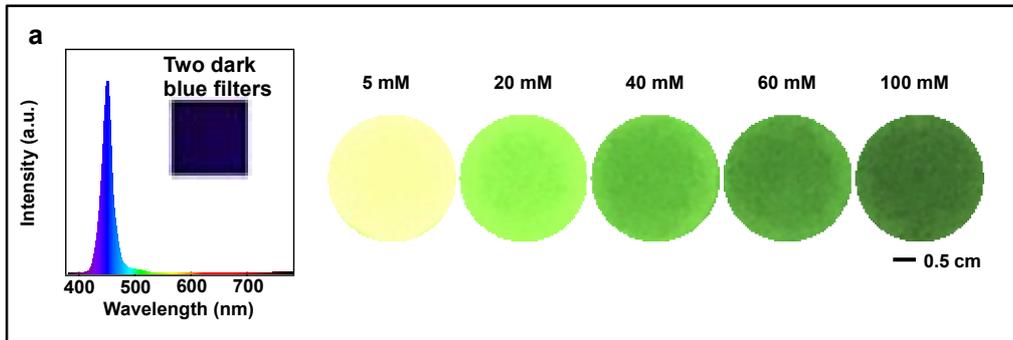
S2 Spectra of smartphone LED light with excitation filters (two dark blue transparent filters) (a) and without filter (b).
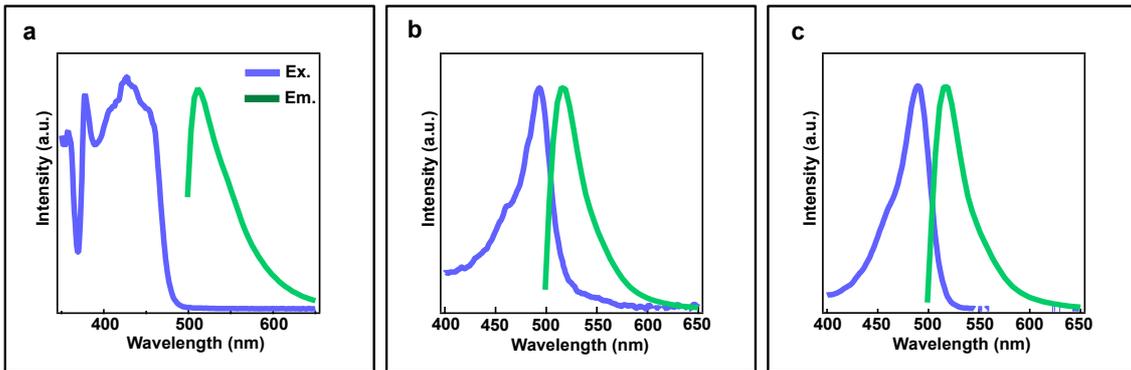
S3 Excitation and absorption spectra of (a) lucigenin for chloride detection, (b) coroNa green for sodium detection, and (c) zinc detector.

S4 Chemical structures of (a) lucigenin for chloride detection, (b) CoroNa green for sodium detection.

a

Intensity (a.u.)

Two dark blue filters

400　500　600　700
Wavelength (nm)

5 mM　20 mM　40 mM　60 mM　100 mM

— 0.5 cm

b

Intensity (a.u.)

A dark blue filters

400　500　600　700
Wavelength (nm)

5 mM　20 mM　40 mM　60 mM　100 mM

— 0.5 cm

c

Intensity (a.u.)

A light blue filters

400　500　600　700
Wavelength (nm)

5 mM　20 mM　40 mM　60 mM　100 mM

— 0.5 cm

S5 Variation of the blue light spectra transmitted from excitation filters (two dark blue transparent filters (a), one dark blue transparent filter (b) and light blue transparent filter (c) and the fluorescence images of chloride assays for 5, 20, 40, 60, and 100 mM chloride solutions under each light.
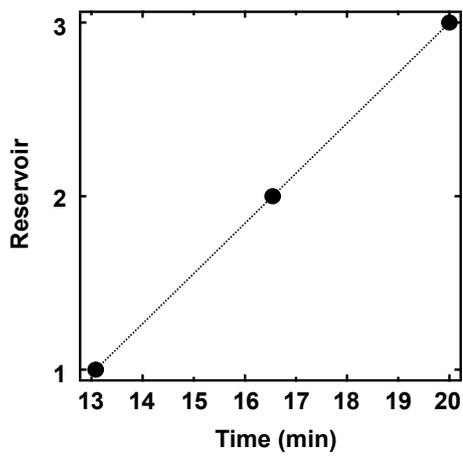
S6 Estimated sweat collection time for each reservoir, including a time delay associated with initiation of sweat.
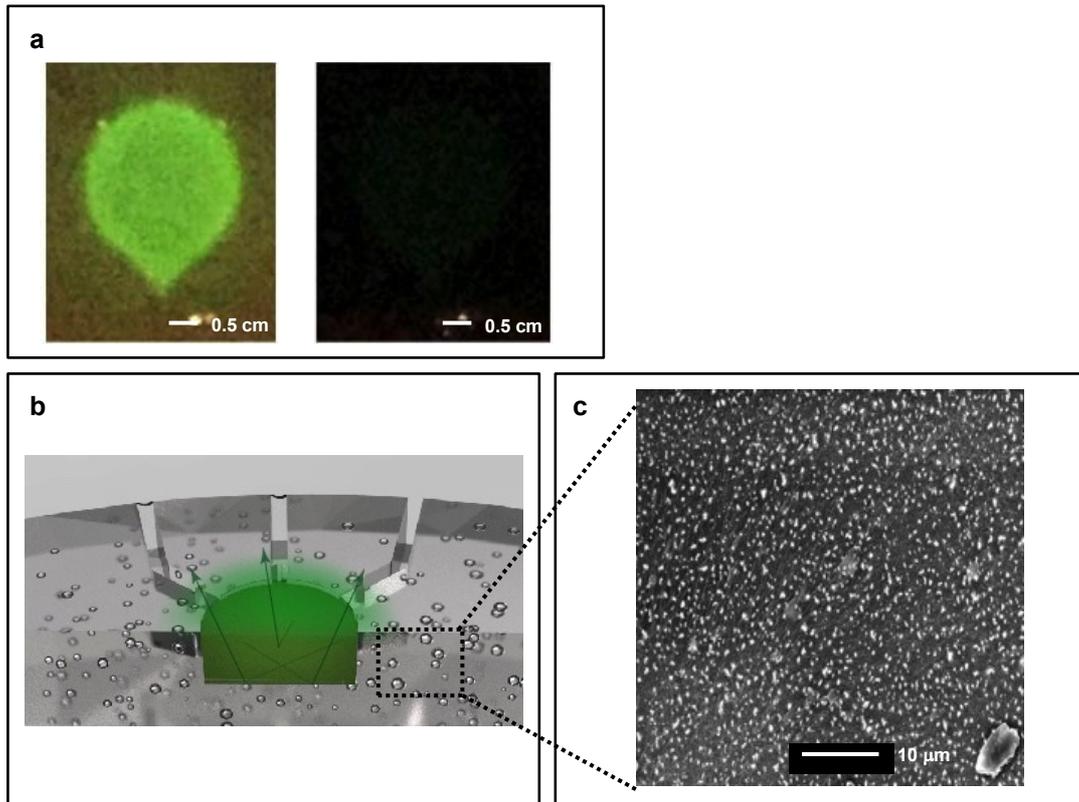
S7 Effect of white PDMS on fluorescence intensity. (a) Difference of the fluorescence image between white and transparent PDMS devices. (b) Schematic illustrating the reflection of fluorescence by the titanium oxide particles included in the white PDMS. (c) SEM image of a white PDMS.