Electronic Supplementary Material (ESI) for Analyst.

Supporting Information

Porous Carbon-Based Robust, Durable, and Flexible Electrochemical Device for K^+ Detection in Sweat

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power, (b) 70% power, (c) 90% power, (d) 96% power and (e) 100% power (scale bar = 1 μm). (f) 70% power, (g) 90% power, (h) 96% power and (i) 100% power (scale bar = 4 μm).

11. **Fig. S11**. Aqueous layer of prepared K^+ sensors using different laser powers.

12. **Fig. S12.** (a) The dimensions and (b) schematic diagram of the preparation of the microfluidic channels. (c) Optical images showing the fluid flow through the channels at different intervals of time.

13. **Table S1.** Comparison of LEC-based K^+ sensor properties with recently reported results.

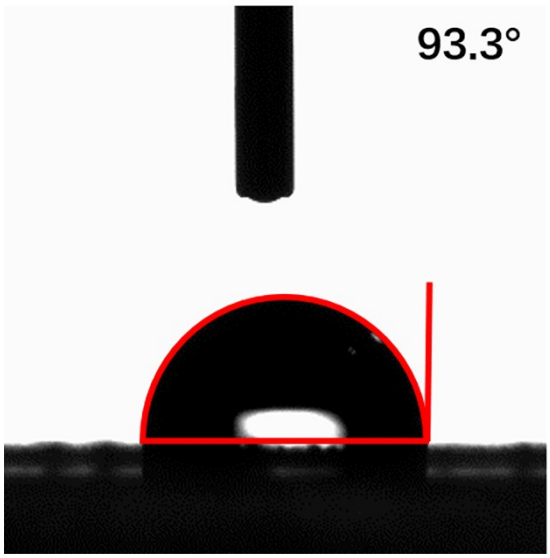

Fig. S1 Contact angle measurement of LEC surface.

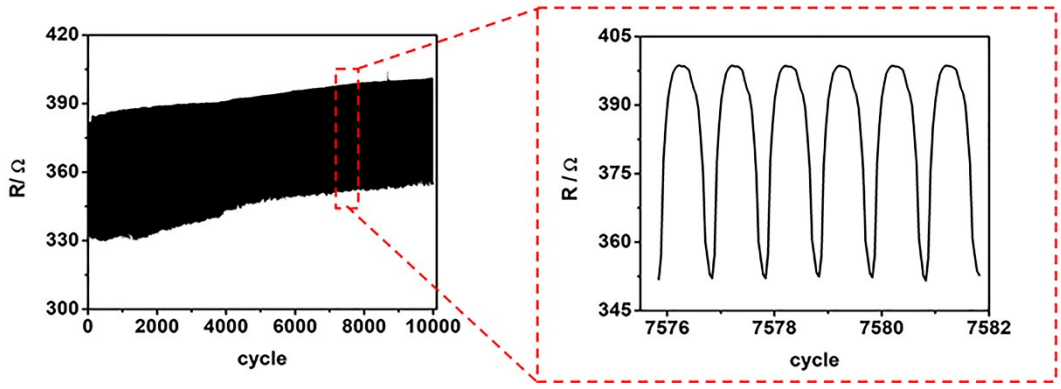

Fig. S2 The resistance change curve of LEC during 10,000 cycles of bending. Inset: enlarged view of six bending cycles.

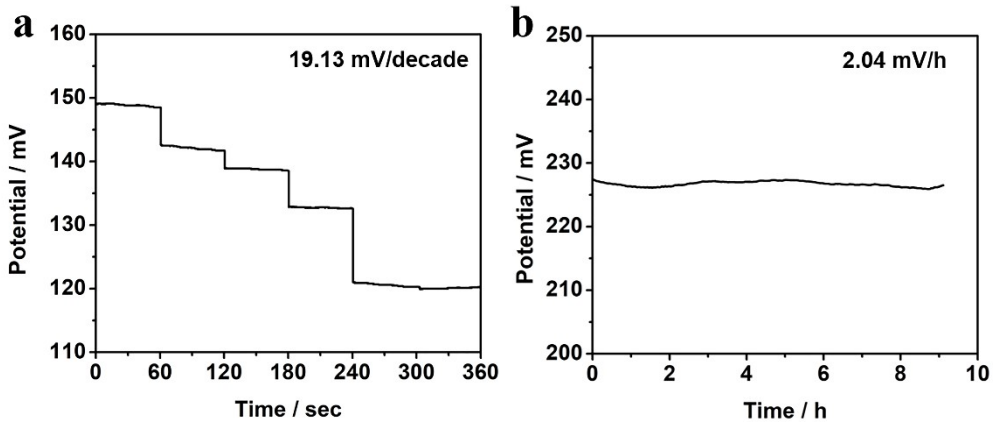

Fig. S3 LEC vs commercial Ag/AgCl RE (a) open circuit potential curve of LEC in 1.0-32.0 mM KCl solution and (b) long-term stability of LEC in 10.0 mM KCl solution.

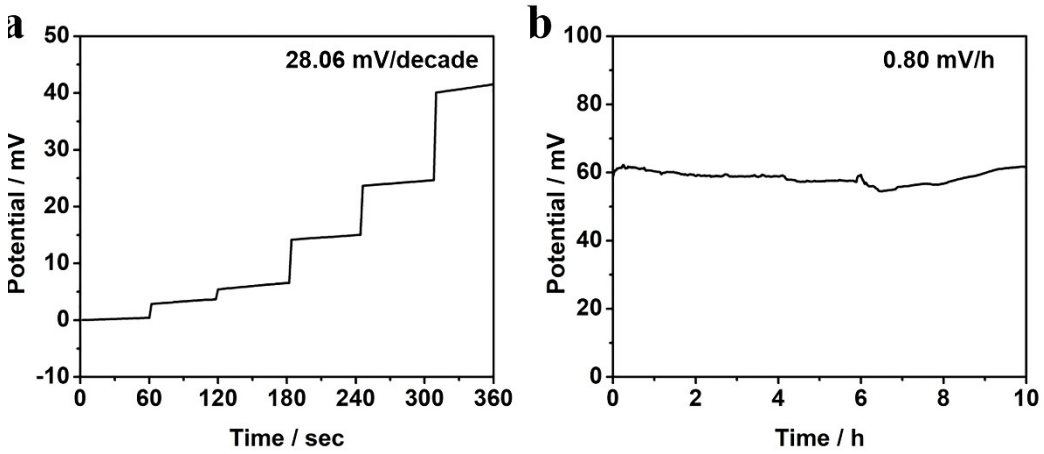

Fig. S4 Ag vs commercial Ag/AgCl RE (a) open circuit potential curve of Ag in 1.0-32.0 mM KCl solution and (b) long-term stability of Ag in 10.0 mM KCl solution.

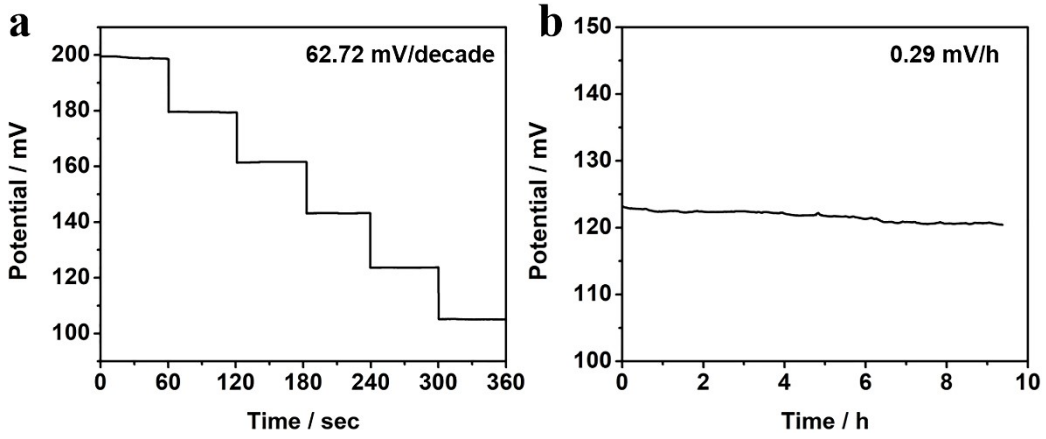

Fig. S5 Ag/AgCl vs commercial Ag/AgCl RE (a) open circuit potential curve of Ag/AgCl in 1.0-32.0 mM KCl solution and (b) long-term stability of Ag/AgCl in 10.0 mM KCl solution.

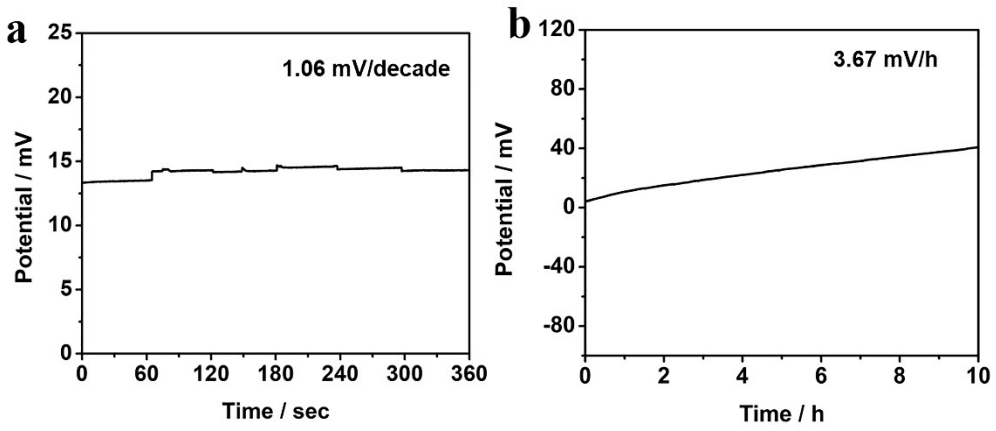

Fig. S6 PVB/Ag/AgCl vs commercial Ag/AgCl RE (a) open circuit potential curve of PVB/Ag/AgCl in 1.0-32.0 mM KCl solution and (b) long-term stability of PVB/Ag/AgCl in 10.0 mM KCl solution.

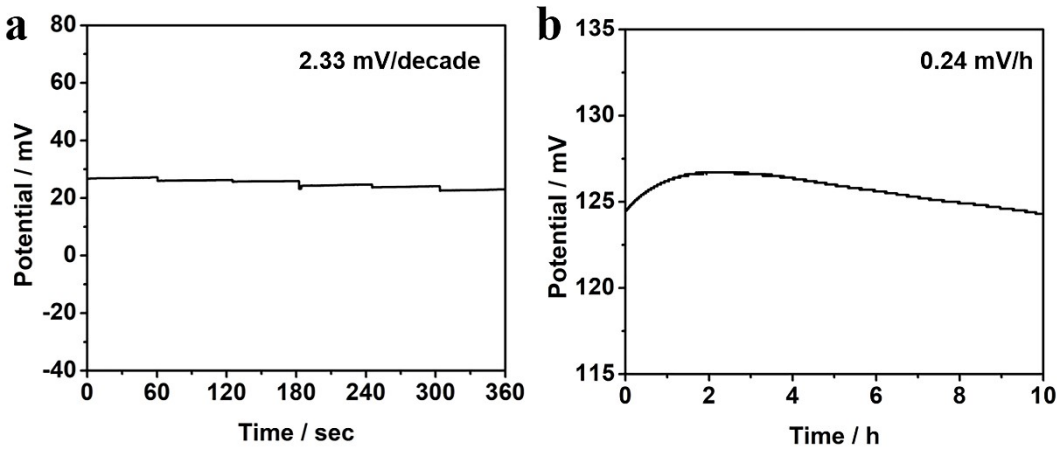

Fig. S7 PVC/hydrogels/Ag/AgCl vs commercial Ag/AgCl RE (a) open circuit potential curve of PVC/hydrogels/Ag/AgCl in 1.0-32.0 mM KCl solution and (b) long-term stability of PVC/hydrogels/Ag/AgCl in 10.0 mM KCl solution.

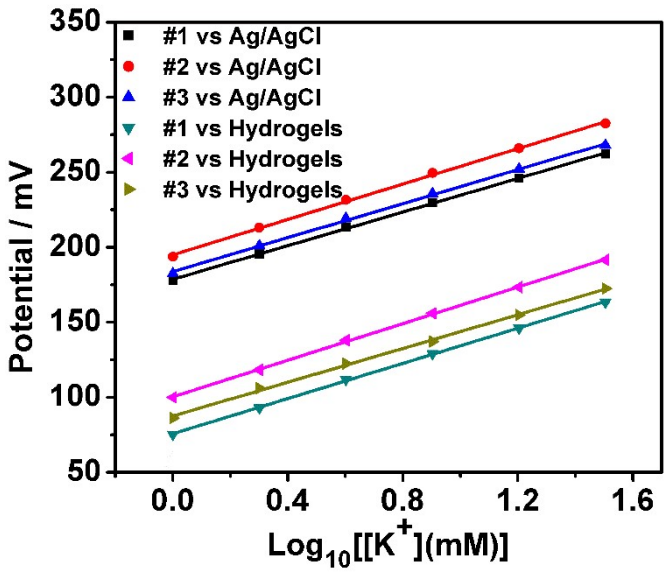

Fig. S8 Comparison of device sensitivity measured by using commercial Ag/AgCl and hydrogels internal reference for three devices fabricated at the same time.

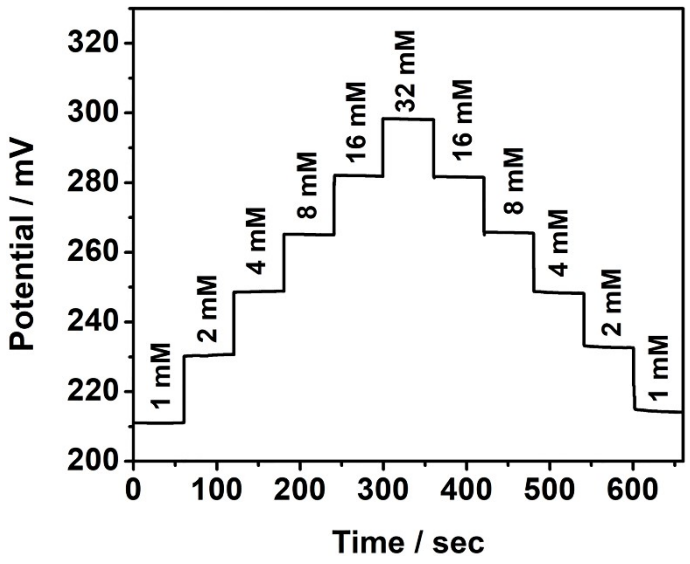

Fig. S9 The reversibility of the K^+ sensor at the cycling of the K^+ concentration value.

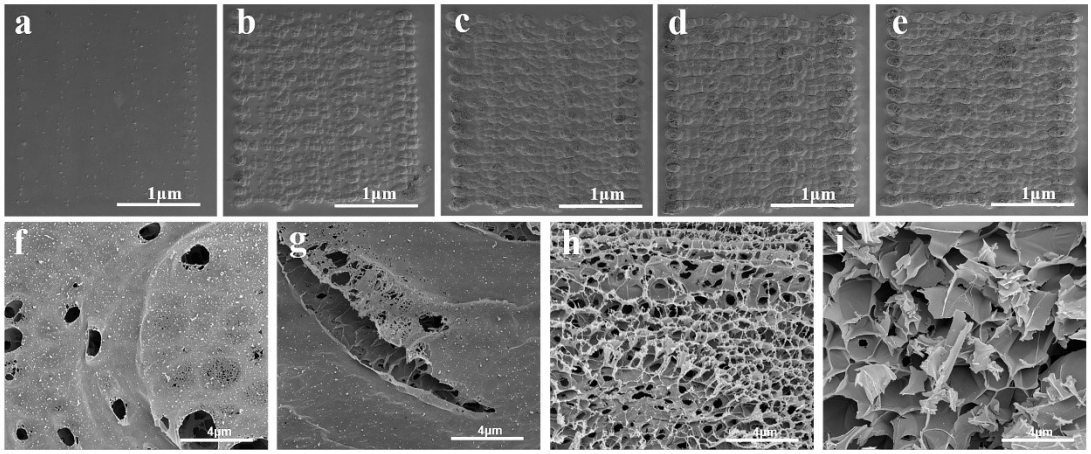

Fig. S10 SEM images of LEC produced using different laser powers. (a) 50% power, (b) 70% power, (c) 90% power, (d) 96% power and (e) 100% power (scale bar = 1 μm). (f) 70% power, (g) 90% power, (h) 96% power and (i) 100% power (scale bar = 4 μm).

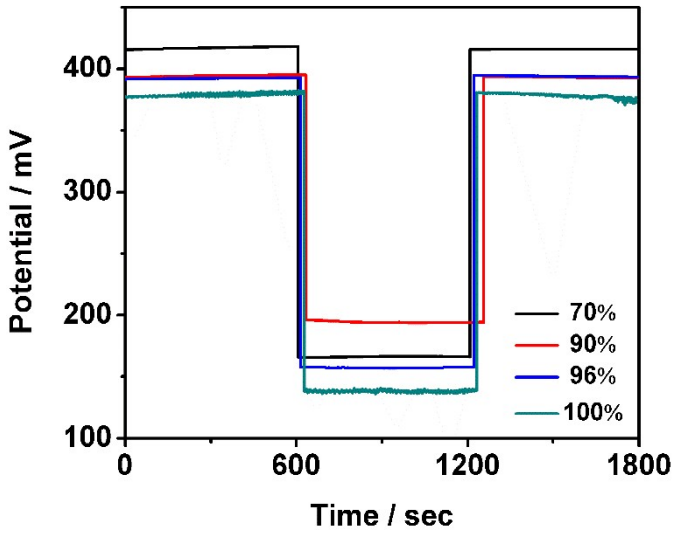

Fig. S11 Aqueous layer of prepared K^+ sensors using different laser powers.

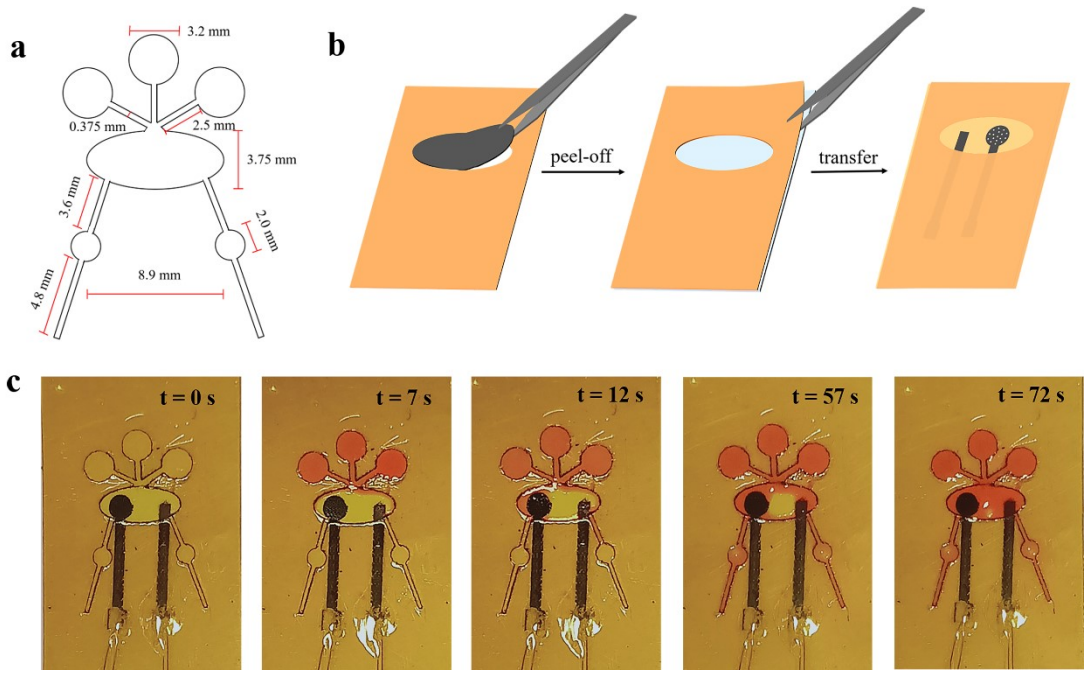

Fig. S12 (a) The dimensions and (b) schematic diagram of the preparation of the microfluidic channels. (c) Optical images showing the fluid flow through the channels at different intervals of time.

Table S1 Comparison of LEC-based K^+ sensor properties with recently reported results

analyte	fabrication method	sensitivity mV/dec	stability	LOD	detection range	response time	year	reference
K^+	screen printing	58.0±4.3	-	$10^{-3.9}$ M	0.1-100 mM	20 s	2017	**1**
K^+	Roll-to-roll rotary screen printing	51.3	-	-	5-40 mM	-	2019	**2**
Na^+	-	56.2	-	-	15-120 mM	-		
K^+	Laser engraving	53.0	90 days	0.1 mM	0.3-150 mM	30 s	2020	**3**
NH_4^+		51.0	40-90 days	0.03 mM	0.1-150 mM	30 s		
K^+	Laser engraving	96.0	-	$10^{-4.5}$ M	Up to 1M	1 s	2021	**4**
K^+	screen printing	60.1	-	-	0.02-200 mM	-	2021	**5**
Na^+		59.5	-	-	0.1-100 mM	-		
K^+	Laser engraving	58.6	84 days	0.1 mM	0.1 mM-1 M	0.8 s		this work

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