Supplementary Information for

A wiping-type semiconductor-liquid generator utilizing water-bearing solid materials and hydrated biological tissues

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Table S1: Selection of water bearing materials for friction.

Fabric type	**Number of cycles before damage**	**Number of cycles before drying**	**softness**
absorbent cloth (eyeglass cloths)	Over 100	Over 100	√
toilet tissue	5-10	Not dried before damage	√
regular silk	Over 100	40-50	√
printing paper	20-30	Not dried before damage	×
foam plastic	Over 100	70-80	×

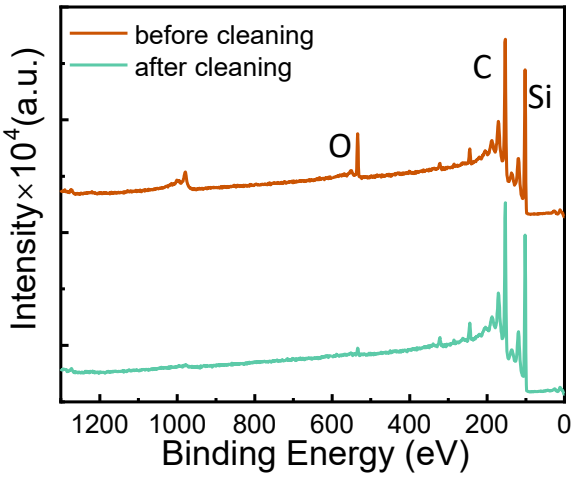

Fig. S1 XPS spectra of Si before and after cleaning with HF.

Table S2: The electrical resistivity of the liquid used as a connecting.

Liquid	Conductivity ($S \cdot m^{-1}$)
C_2H_5OH	10^{-7}
DI water	5.5×10^{-6}
NaCl (1M, aq)	126.4
Na2Cl (1M, aq)	156.1

Table S3: Surface charge density of Solid-solid TENG & TVNG in previous studies.

Mode	Charge density ($mC \cdot m^{-2}$)	Reference
Solid-solid TENG	0.13	[40]
Solid-solid TENG	0.43	[46]
Solid-solid TENG	1.2	[42]
TENG in humid environment	2.38	[36]
Solid-solid TENG	3.53	[37]
Solid-solid TENG	Over 4	[44]
Solid-solid TENG	8.8	[45]
Solid-solid TVNG	23	[41]
Solid-solid TVNG	31	[47]
Solid-solid TVNG	79.31	[43]
Solid-solid TVNG	98	[39]
Solid-solid TVNG	136.3	[38]

Table S4: Surface charge density of Solid-liquid generator in previous studies.

Mode	Charge density ($mC \cdot m^{-2}$)	Reference
Solid-liquid TENG	0.103	[17]
DEG	0.185	[19]
Solid-solid TENG	0.391	[15]
Solid-liquid TENG	0.4	[16]
Solid-liquid TENG	0.5	[20]
Solid-liquid TENG	1.8	[48]
Solid-liquid TENG	1.92	[18]

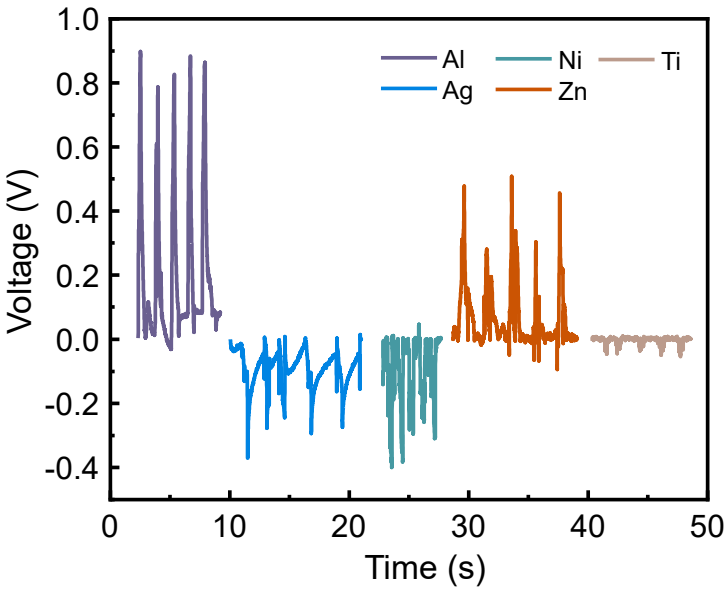

Fig. S2: The detailed data of voltage of wiping generator using different upper metal electrode.

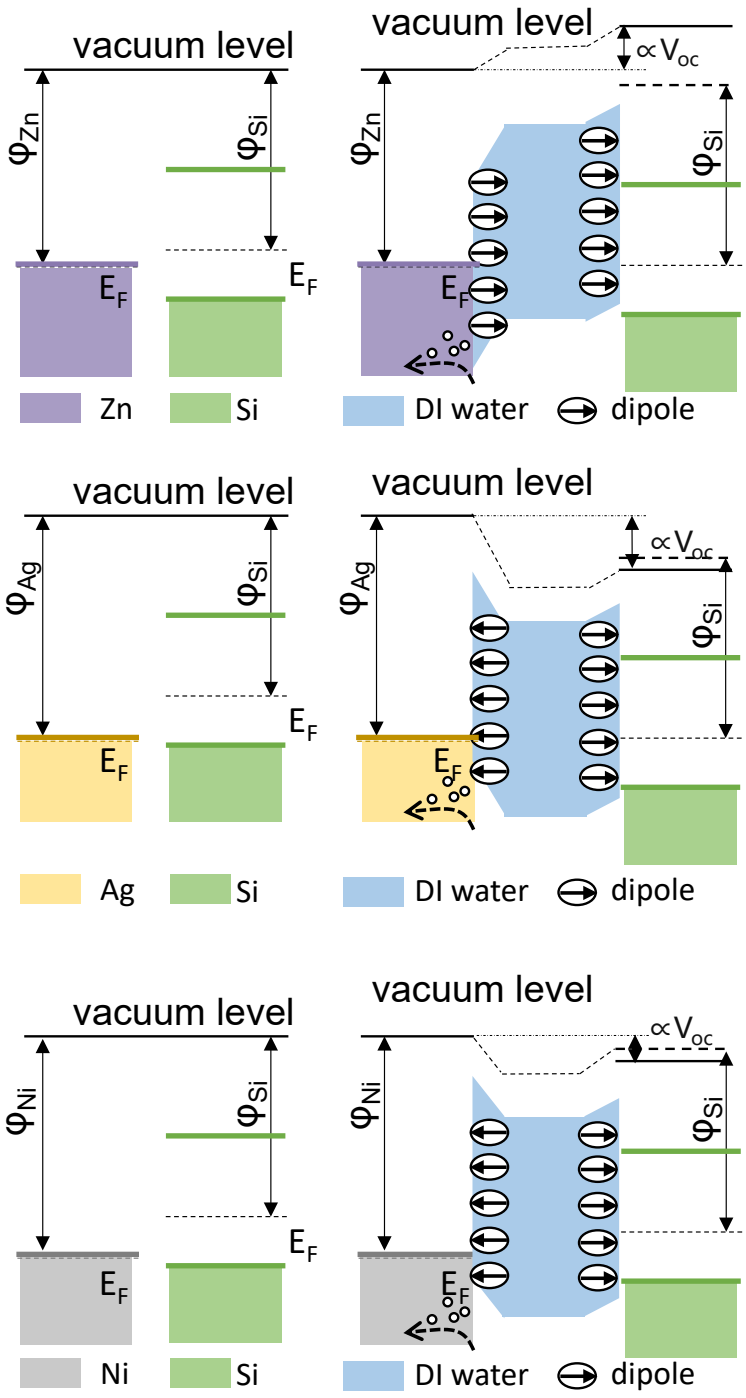

Fig. S3 Band diagram variations of Zn-Si, Ag-Si and Ni-Si Schottky under water excitation.

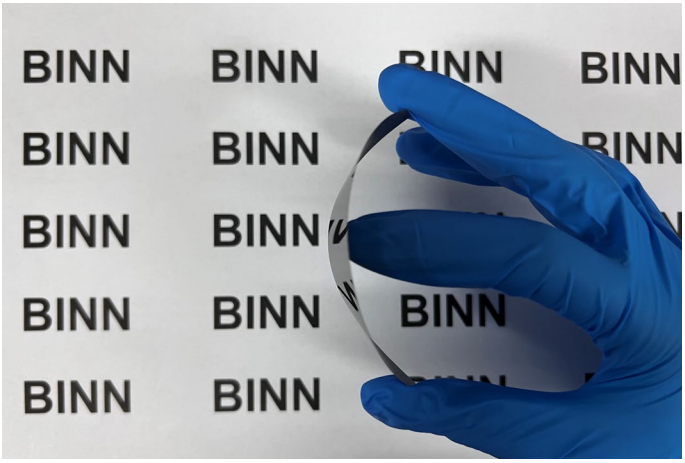

Fig. S4 Flexibility display of 100 μm Si wafer.

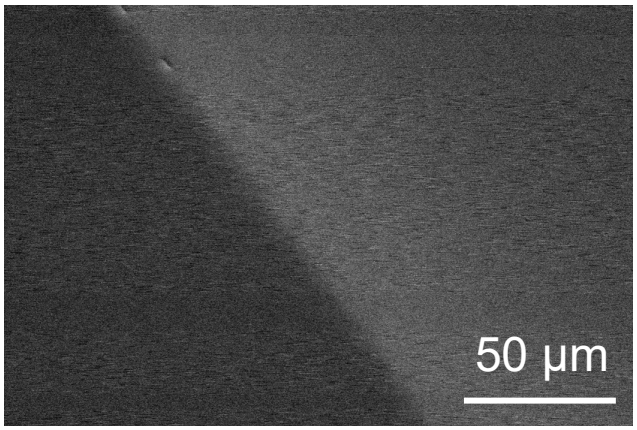

Fig. S5 SEM image of silicon wafer edge embedded in PDMS.

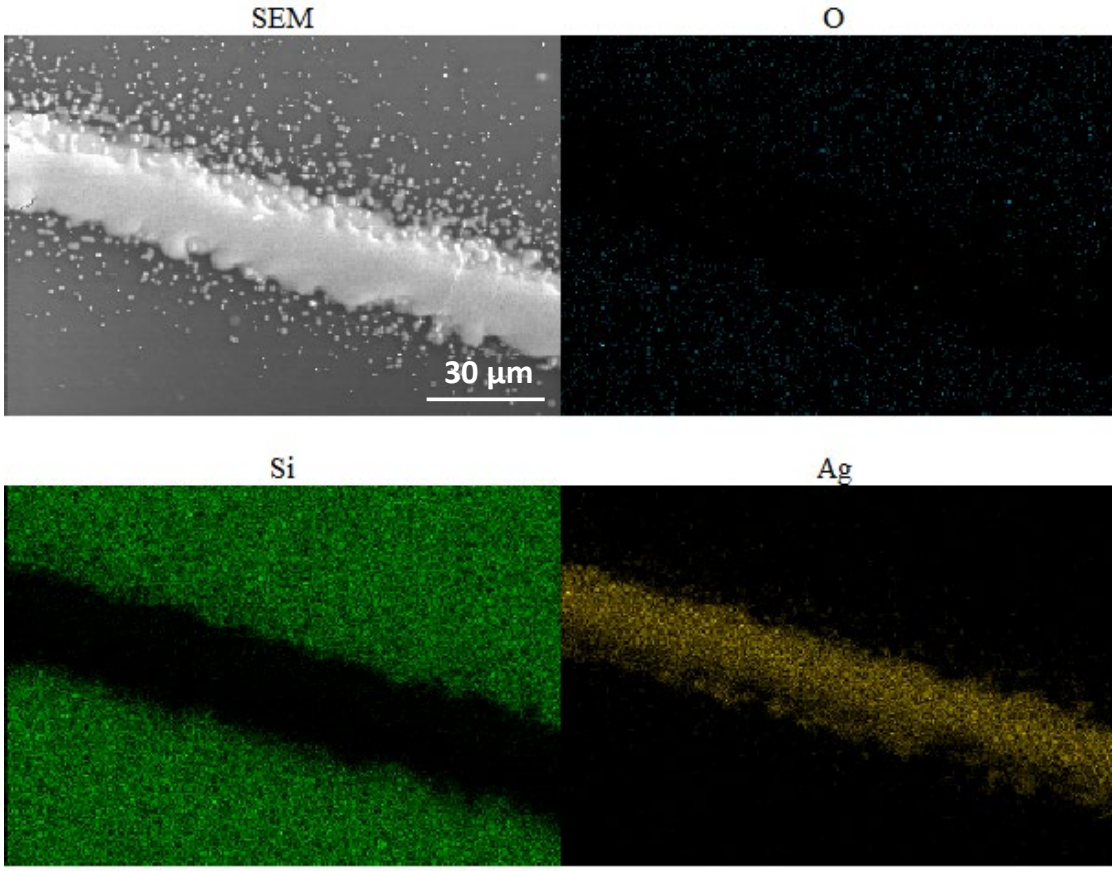

Fig. S6 Energy Dispersive Spectrometer spectra of the PDMS substrate and Ag wire on smart contact lenses.

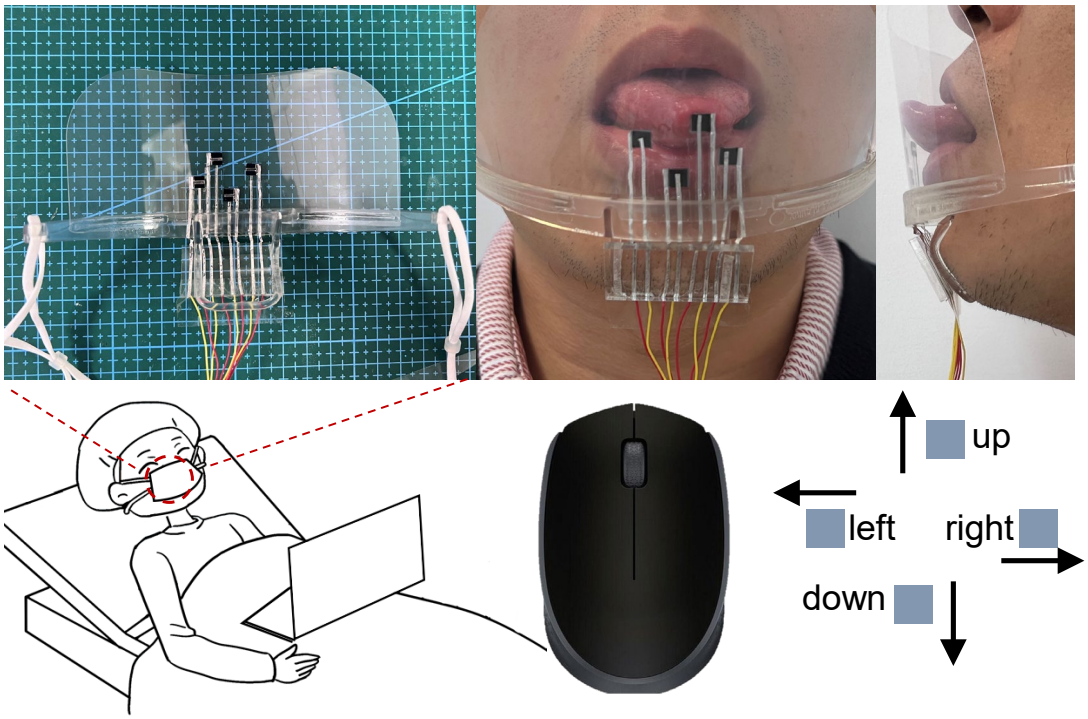

Fig. S7 The demonstration of sensor based on wiping generator, used for expression indication in paralyzed patients. The mask with four independent patch sensors on the inner surface, enabling paralyzed individuals to communicate basic directions using tongue movements.

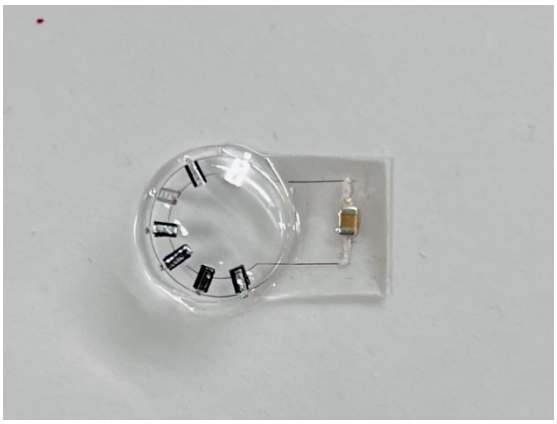

Fig. S8: The smart contact lens with capacitors to store electrical energy.