Supporting Information

Injectable Flexible Subcutaneous Electrode Array Technology for Electrocardiogram Monitoring Device

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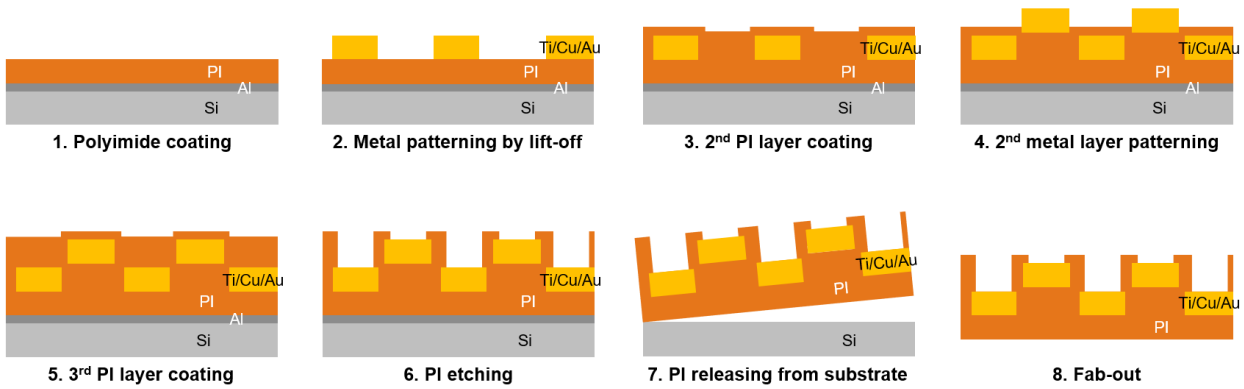

Figure S1. Schematic diagram depicting the fabrication process for the injectable electrocardiogram (I-ECG) device.

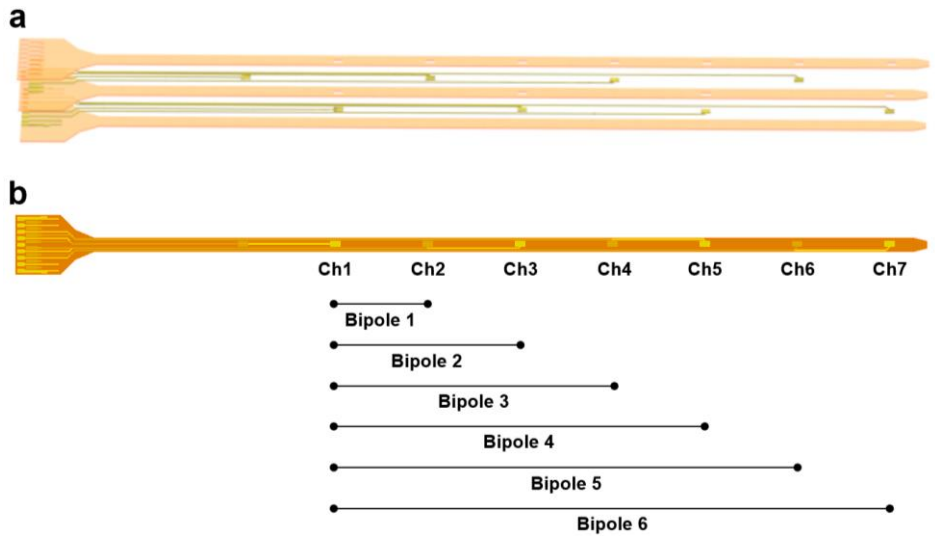

Figure S2. (a) An exploded side and (b) top view of the I-ECG device with number of channel and bipole. Bipole 1 (Ch1-Ch2), Bipole 2 (Ch1-Ch3), Bipole 3 (Ch1-Ch4), Bipole 4 (Ch1-Ch5), Bipole 5 (Ch1-Ch6), and Bipole 6 (Ch1-Ch7).

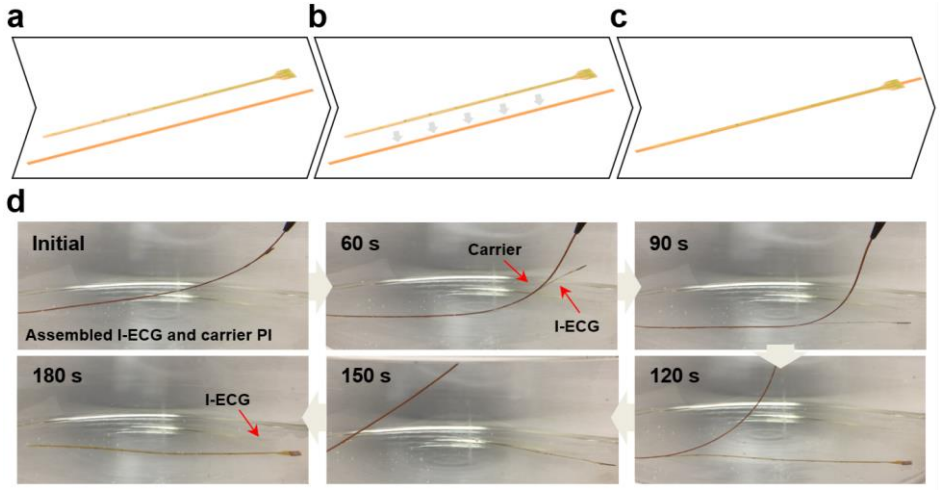

Figure S3. Schematic illustrations to demonstrate the working principle of the procedure. (a) A 500 μm thick carrier PI was used for ease of control during the implantation process. (b) PVA is spread between ECG and carrier PI (c) Attached ECG to carrier PI. (d) Sequential photographs of degradation and separation between I-ECG and carrier PI in normal body temperature (37^{o}C) DI water. 180 sec is approximately the time constant for this sample.

The PVA was successfully degraded and separation between the carrier PI and I-ECG in normal body was achieved at body temperature (37^{o}C) DI water (Figure S3d). The assembled I-ECG and carrier PI at initial state was individualized gradually and isolated sequentially by dissolving the PVA. After 3 min, they were completely separated.

Table S1. ECG parameters in sinus rhythm based on electrodes used to detect the signals. Values reported as mean ± standard deviations. Each bipole was the average of 20 electro-grams (10 using vertical electrodes and 10 using Horizontal electrodes)

Bipole	RR interval (ms)	QRS Amplitude (mV)	QRS Duration (ms)	P-wave Amplitude (mV)	P- wave Duration (ms)	PR Interval (ms)	T-wave Amplitude (mV)	T-wave Duration (ms)	QT Interval (ms)
Lead I	484 (±24.3)	0.59 (±0.110)	70 (±10.7)	0.14 (±0.070)	53 (±4.6)	108 (±3.7)	0.20 (±0.066)	75 (±14.2)	318 (±7.7)
Lead V1	484 (±24.3)	0.6 (±0.230)	68 (±8.5)	0.19 (±0.205)	53 (±7.0)	110 (±7.6)	0.19 (±0.058)	73 (±15.2)	289 (±29.9)
Lead aVF	484 (±24.3)	0.45 (±0.079)	69 (±8.8)	0.13 (±0.022)	52 (±5.6)	122 (±5.4)	0.16 (±0.020)	74 (±12.7)	305 (±35.1)
Bipole 1	484 (±24.3)	0.14 (±0.047)	60 (±10.0)	0.02 (±0.019)	52 (±8.2)	120 (±8.9)	0.04 (±0.035)	76 (±9.3)	308 (±8.6)
Bipole 2	478 (±26.1)	0.17 (±0.088)	71 (±8.8)	0.04 (±0.026)	55 (±7.5)	119 (±8.5)	0.09 (±0.023)	76 (±8.5)	308 (±11.2)
Bipole 3	484 (±24.3)	0.23 (±0.171)	73 (±9.0)	0.05 (±0.034)	56 (±5.4)	121 (±9.1)	0.11 (±0.028)	78 (±8.3)	304 (±9.4)
Bipole 4	484 (±24.3)	0.29 (±0.112)	78 (±12.4)	0.07 (±0.014)	55 (±7.1)	115 (±10.5)	0.11 (±0.032)	81 (±8.4)	305 (±18.6)
Bipole 5	497 (±3.3)	0.33 (±0.066)	80 (±6.2)	0.09 (±0.011)	58 (±7.4)	119 (±9.1)	0.12 (±0.031)	91 (±11.7)	318 (±6.8)
Bipole 6	484 (±24.3)	0.58 (±0.130)	78 (±8.6)	0.10 (±0.022)	56 (±6.5)	119 (±9.7)	0.14 (±0.029)	85 (±8.8)	317 (±10.4)

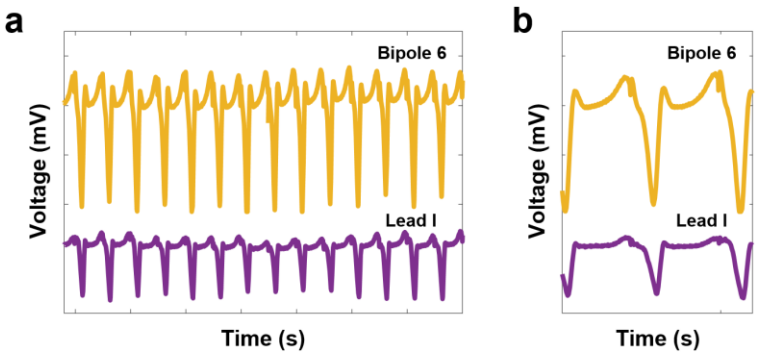

Figure S4. *In vivo* (a) Simulated arrhythmia (ventricular pacing) signals were detected from the farthest bipolar electrodes and conventional surface ECG. (b) Expanded ECG signals of simulated arrhythmia signals (tick scale: x-axis 0.5 s, y-axis 0.5 mV).