Supporting Information

Ultra-Stretchable and Shape-Memorable Output-Boosted Triboelectric Nanogenerator Utilizing Highly Ordered Microdome-Crowning Thermoplastic Polyurethane for Finger-Motion Detection Sensor

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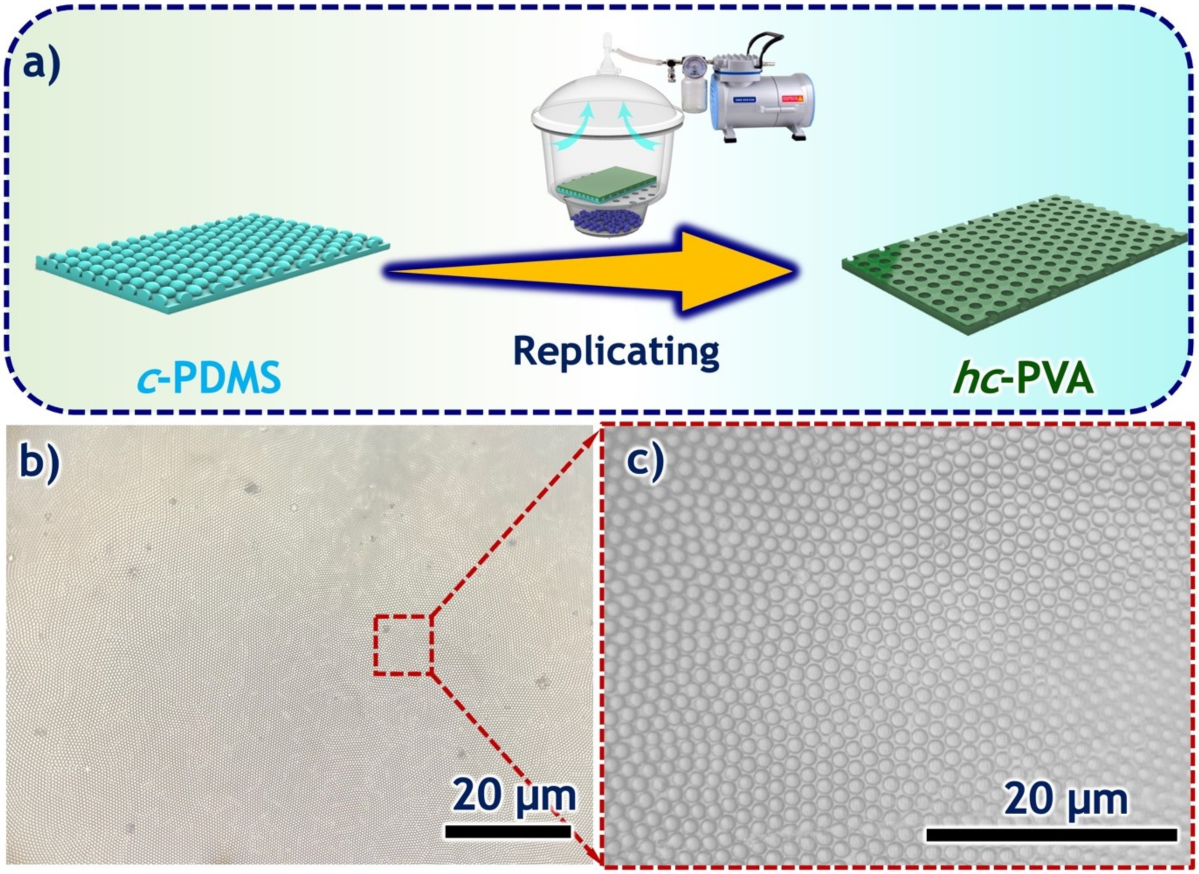

Figure S1. Fabrication of *hc*-PVA master mold. (a) Fabricating procedure of *hc*-PVA master mold. (b-c) Optical microscopy image of *hc*-PVA master mold.

The fabrication of *hc*-PVA mold was implemented using the Improved Phase Separation technique (IPS) and molding replica. First, honeycomb concave structured polyimide (*hc*-PI) was prepared through 2-stage process: spin-coating the PI solution 5 wt. % in chloroform onto a copper substrate with the speed of 600 rpm to produce a flat surface, and then dip-coating it into a pair of chloroform/methanol mixture for 5 s to carry out IPS process in the ambient environment [24]. In the next stage, PDMS was carefully casted onto the surface of *hc*-PI with degassing technique to remove bubbles and replicate the exact counterpart of *hc*-PI [23]. Similarly, the PVA solution 12 wt. % in distilled water was drop-cast onto the convex PDMS, then putting into the vacuum desiccator in 10 min before exposing to the normal air for natural drying in 2 days (**Figure S1a**). The *hc*-PVA morphology can be observed in **Figure S1b-c**.

Figure S2. Enhancement in effective contact surface area among various pattern features: microdome, cube and pyramid. The surface area values were calculated using similar pattern height (2.5 μm) and projected width (2 μm) by Rhino software version 7.0.

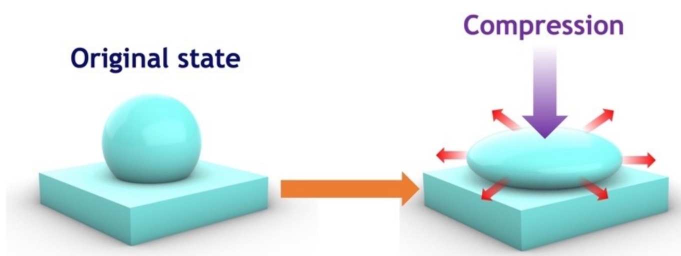

Figure S3. Multi-direction lateral deformation of microdome.

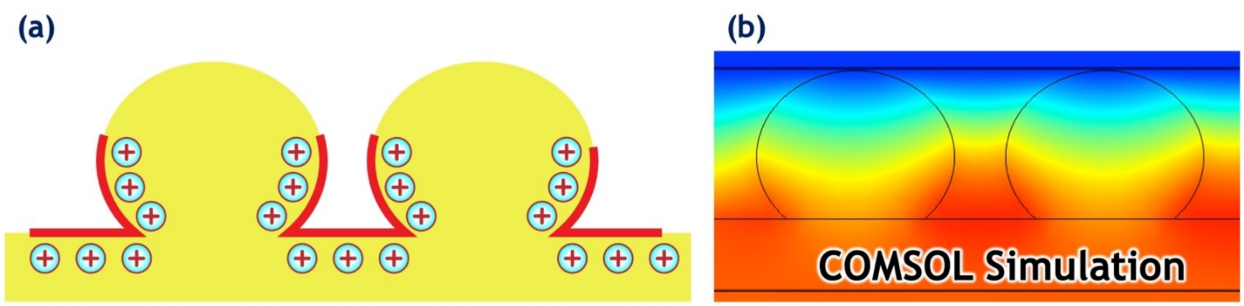

Figure S4. "Cubital fossa"-like storing effect.

Table S1. A comparison of output voltage signals among various human motion sensors

Materials	Voltage (V)	Location of sensor	Reference
Knitting graphene textile	15 18	Knee, slow running Knee, fast walking	15

	20	Knee, running	
FEP, silicone/carbon black	140 175 60 250	Knee, walk Knee, high Knee, slight jump Knee, high jump	16
PDMS/galinstan liquid metal nanoparticles	10	Pressure sensing by hand-tapping	17
Pyramid PDMS, polyimide, gold, epidermis	70	Finger, 60° bending	18
PTFE, magnetic pole, copper	0.4	Finger, 90° bending	19
ITO, FEP, PDMS, skin	5	Finger, bending	20
Carbon fiber, PVA, PDMS as Multifunctional Coaxial Energy Fiber	0.6	Finger, 90° bending	21
Mxene ($T_3C_2T_x$), polydimethylsiloxane, Copper/nickel textile	23 35 32	Finger tapping Hand clapping Hammering	22
Ionogel from acrylic acid (AA) and 3-dimethyl (methacryloyloxyethyl) ammonium propane sulfonate (DMAPS), PDMS, PU	3 2 0.75	Elbow, 60° bending Elbow, 90° bending Elbow, 135° bending	S2
Microdome TPU, microdome PDMS	15 40 60	Finger, 1st joint bending Finger, 2nd joint bending Finger-tapping	This study

Video S1. High stretching property of *c*-TPU (.mp4)

Video S2. *c*-TPU based TENG powering 120 LEDs (.mov)

Video S3. First joint bending signals (.mp4)

Video S4. Second joint bending signals (.mp4)

Video S5. Finger-tapping signals (.mp4)

Video S6. Softly hand-pressing signals (.mp4)

Video S7. Flexible TENG bending signals (.mp4)

Video S8. Flexible TENG twisting signals (.mp4)

References

S1 G. H. Nguyen Hoang, N. M. Chau, T. Van Le, V. T. Bui and T. T. H. La, *Polymer (Guildf).*, 2023, **285**, 126321.

S2 L. Sun, S. Chen, Y. Guo, J. Song, L. Zhang, L. Xiao, Q. Guan and Z. You, *Nano Energy*, 2019, **63**, 103847.