

Supplementary Information

Skin-Integrated stretchable actuators toward skin-compatible haptic feedback and closed-loop human-machine interactions

Si Chen¹, Yanjun Chen², Ji Yang³, Teng Han^{2*}, Shanshan Yao^{1*}

¹ Department of Mechanical Engineering, Stony Brook University, Stony Brook, NY 11794, USA.

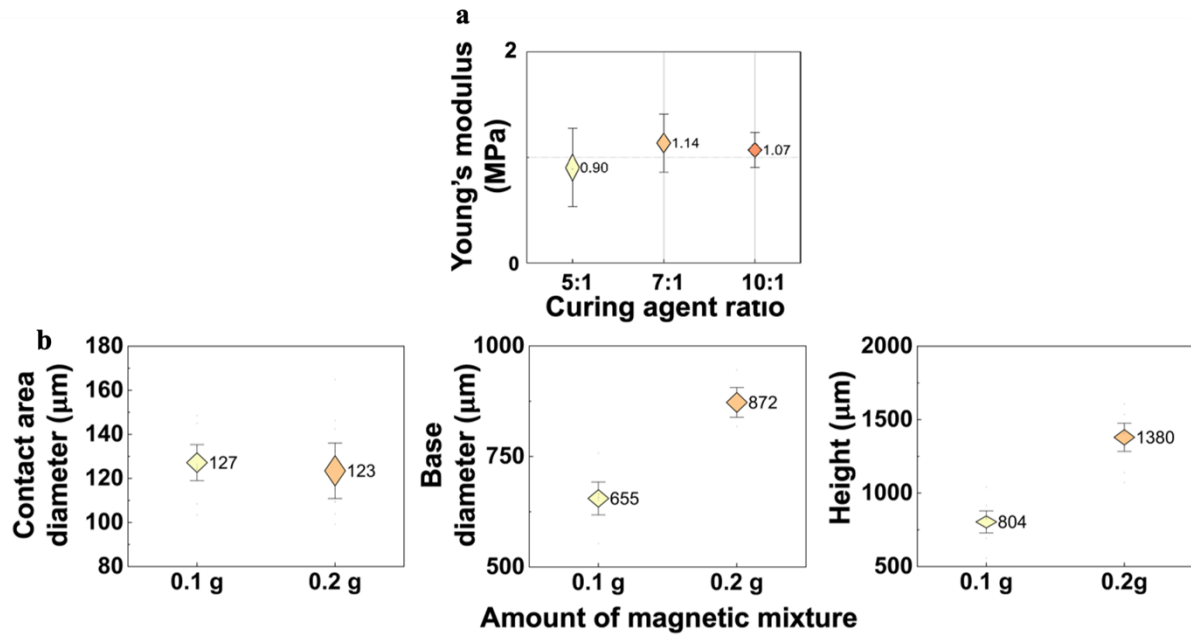
² Institute of Software, Chinese Academy of Sciences, Beijing 100190, China.

³ Meta, Menlo Park, CA 94025, USA.

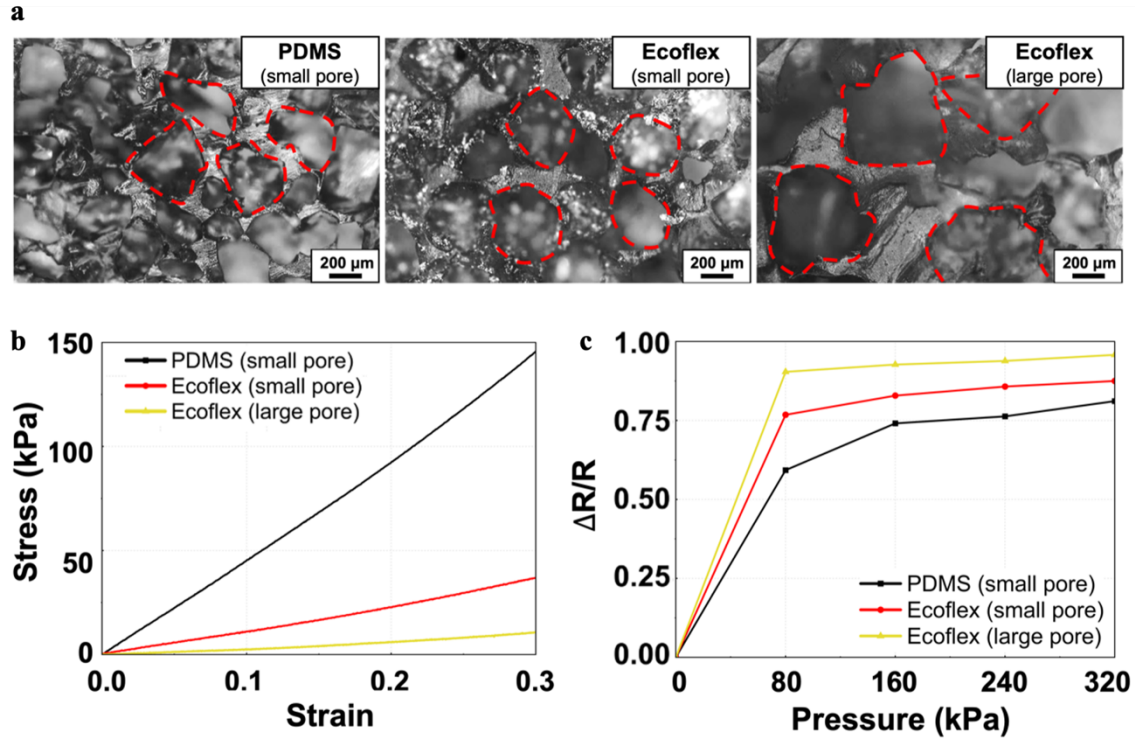
Corresponding authors.

*Teng Han, Email: hanteng@iscas.ac.cn

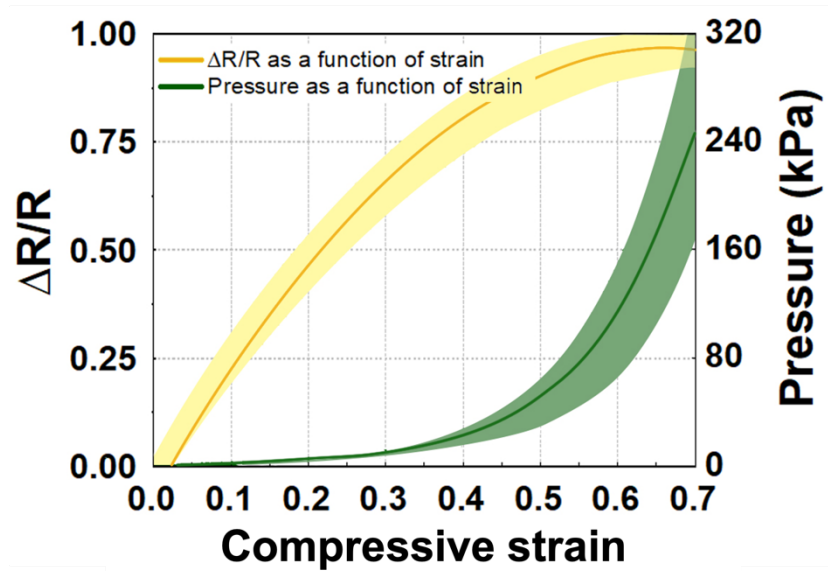
*Shanshan Yao, Email: shanshan.yao@stonybrook.edu



Supplementary Figure 1. Soft pillar optimization. **a.** Young's moduli for PDMS with different curing agent ratios. **b.** The contact area diameter, base diameter, and height of pillars when fabricated using different amounts of magnetic mixture.

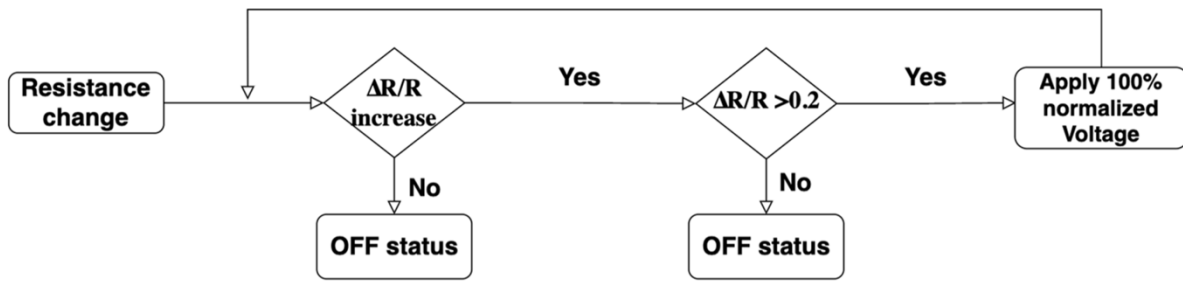


Supplementary Figure 2. Properties of different porous materials. **a.** Optical images of different porous materials: PDMS with small pore sizes, Ecoflex with small pore sizes, and Ecoflex with large pore sizes. **b.** Stress as a function of compressive strain for different porous materials. **c.** Resistance changes as a function of pressure for different porous materials.

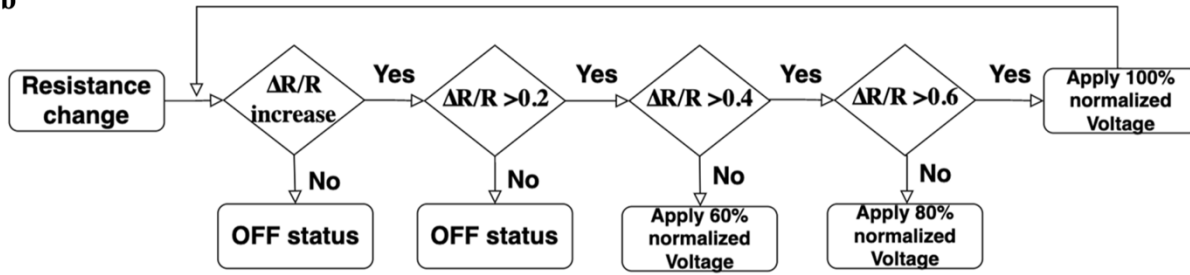


Supplementary Figure 3. Sensor's resistance change and pressure as a function of the compressive strain.

a



b



Supplementary Figure 4. Modulations of the actuator voltage based on the resistance change of pressure sensors. a. Surface texture recognition. b. Object shape recognition.