Supplementary Information

Lightweight, Compressible and Electrically Conductive Polyurethane Sponges Coated with Synergistic Multiwalled Carbon Nanotubes and Graphene for Piezoresistive Sensors

Zhonglei Ma*[1], Ajing Wei[1], Jianzhong Ma*[2], Liang Shao[1], Huie Jiang[2], Diandian Dong[2], Zhanyou Ji[2], Qian Wang[1], Songlei Kang[1]

[1] College of Chemistry and Chemical Engineering, Key Laboratory of Auxiliary Chemistry and Technology for Chemical Industry, Ministry of Education, Shaanxi University of Science and Technology, Xi'an, 710021, P. R. China

[2] College of Bioresources Chemical and Materials Engineering, Shaanxi University of Science and Technology, Xi'an, 710021, P. R. China

*Correspondence to: Z. Ma (E-mail: mazl@sust.edu.cn) and J. Ma (E-mail: majz@sust.edu.cn)

1. Relative increases in mass and properties of conductive PU-based sponges

Table S1 shows the relative increases in mass, densities and conductivities of RGO@PU, MWCNT@PU and MWCNT/RGO@PU sponges with different LBL dip-coting cycles and concentrations.

Table S1. Relative increases of mass, densities and conductivities of RGO@PU, MWCNT@PU and MWCNT/RGO@PU sponges with different LBL dip-coting cycles and concentrations.

Materials	Concentration of GO and MWCNT suspensions	Dip-coating Cycle	Increase of mass (%)	Density (g/cm^3)	Conductivity (S/m)
PU	—	0	0.00	0.0261	0
RGO@PU	1.5	1	2.68	0.0268	0.003
	3.0	1	4.98	0.0274	0.007
	4.5	1	6.51	0.0278	0.011
	6.0	1	6.90	0.0279	0.015
MWCNT@PU	1.5	1	3.83	0.0271	0.004
	3.0	1	17.24	0.0306	0.011
	4.5	1	22.61	0.0320	0.017
	6.0	1	32.18	0.0345	0.023
MWCNT/RGO@PU	1.5	1	4.98	0.0274	0.018
		3	16.09	0.0303	0.025
		5	20.69	0.0315	0.039
	3.0	1	16.09	0.0303	0.041
		3	28.35	0.0335	0.049
		5	36.02	0.0355	0.062
	4.5	1	34.87	0.0352	0.072
		3	72.03	0.0449	0.079
		5	94.64	0.0508	0.086
	6.0	1	35.63	0.0354	0.101
		3	102.68	0.0529	0.105
		5	145.59	0.0641	0.106

The MWCNT/RGO@PU sponges present increase of mass, density and conductivity compared with the RGO@PU and MWCNT@PU sponges. With increasing LBL dip-coting cycles and suspension concentrations, the conductive PU-based sponges

exhibit higher increases in mass, densities and conductivities.

2. The response time

The response time is an important parameter for piezoresistive sensors. As shown in Figure S1, the current-time response curves were recorded when the sensor was sequentially subject to 25%, 50%, 75% compressive strain or relaxed. From the inset magnification, it can be find that the response time is less than 0.75 s, indicating that the sensor is sensitive to detect strain changes with a short response time.

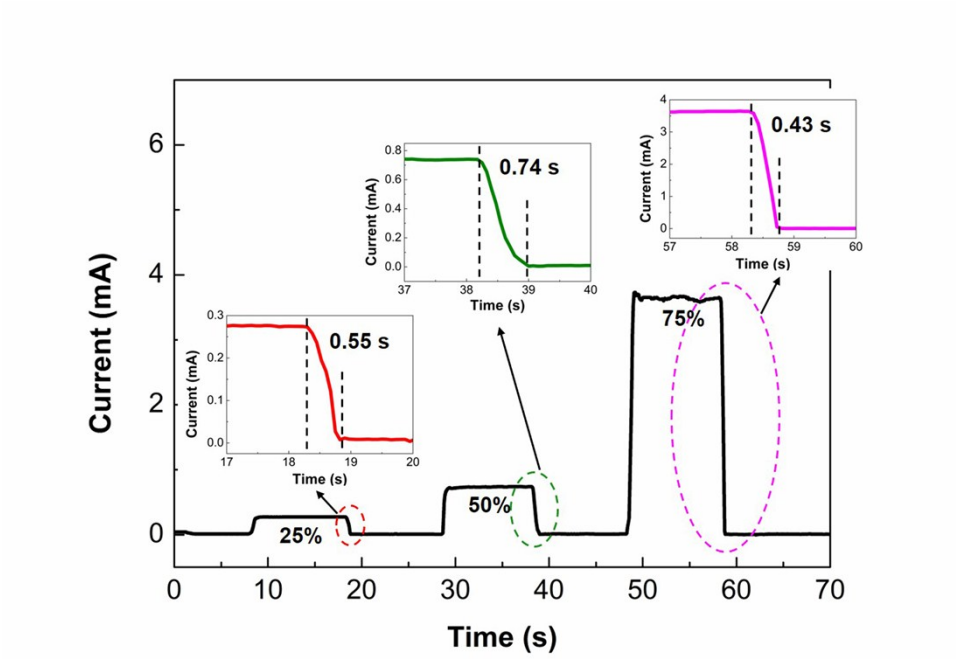

Figure S1. Current-time response curves and response time of the sensor when 25%, 50% and 75% compressive strain were applied, respectively.