Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Supporting Information:

Multi length scale hierarchical architecture overcoming pressure sensing range-speed tradeoff for flexible pressure sensors

Qiong Tian [a], Wenrong Yan [a, c], Tianding Chen [a], and Derek Ho* [a, b]

[a] Department of Materials Science and Engineering, City University of Hong Kong, Tat Chee Avenue, Kowloon, Hong Kong, China

[b] Hong Kong Centre for Cerebro-Cardiovascular Health Engineering, Hong Kong, China

[c] Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, Shenzhen, 518055, China

† Corresponding email: derekho@cityu.edu.hk

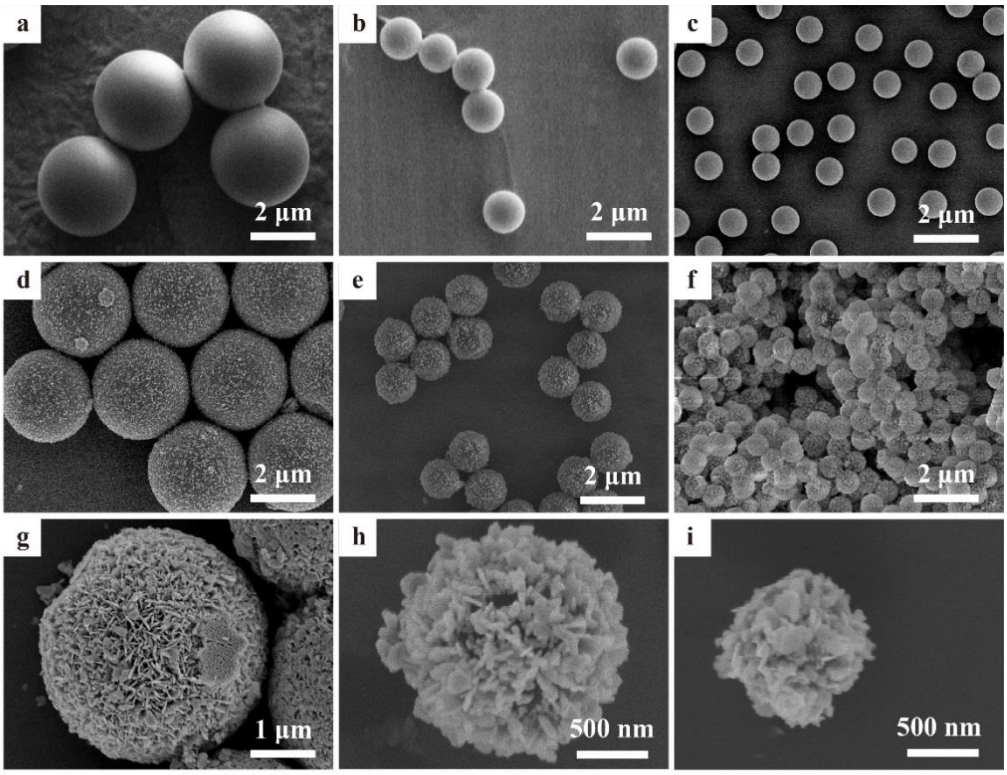

Figure S1. SEM images of (a-c) PS microspheres, (d-f) PS microspheres with Ag nanoparticles (AgNPs), and (g-h) Ag microflowers (AgMFs) with different sizes: (a, d, g) 3 µm, (b, e, h) 1.4 µm, and (c, f, i) 0.8 µm.

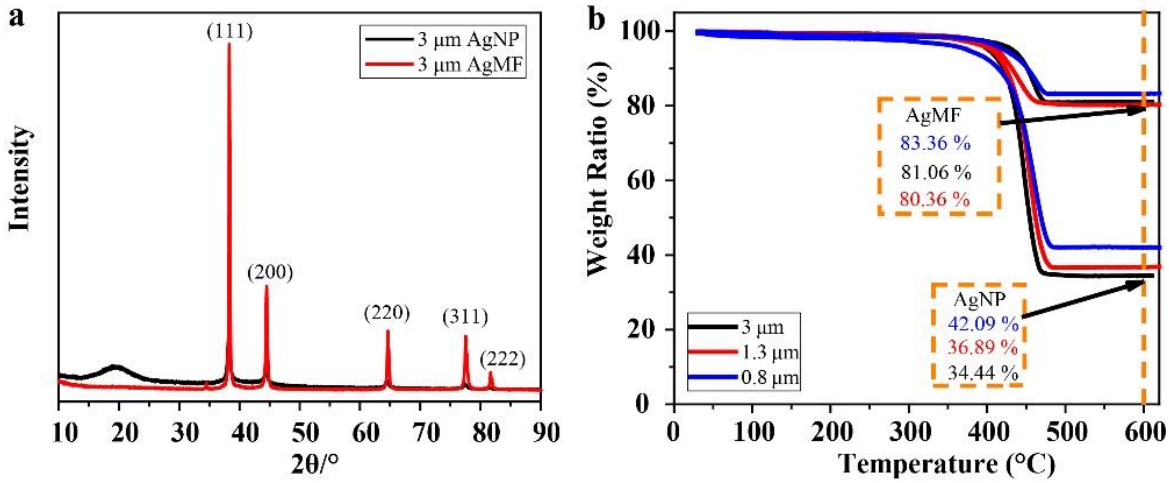

Figure S2. (a) XRD and (b) thermogravimetric analyses.

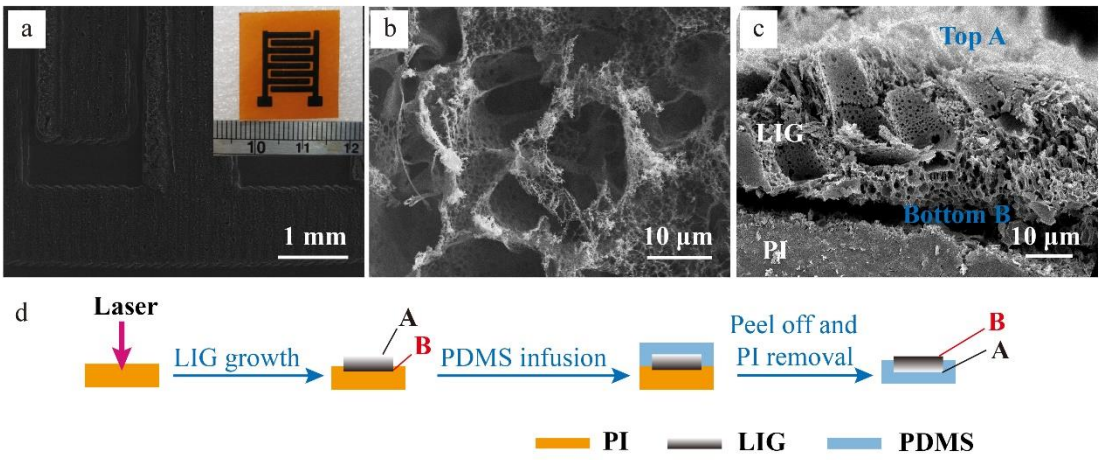

Figure S3. Surface (a,b) and crossesection (c) images of LIGIDEs and the process illustration of transferring LIG onto and partially infused with PDMS.

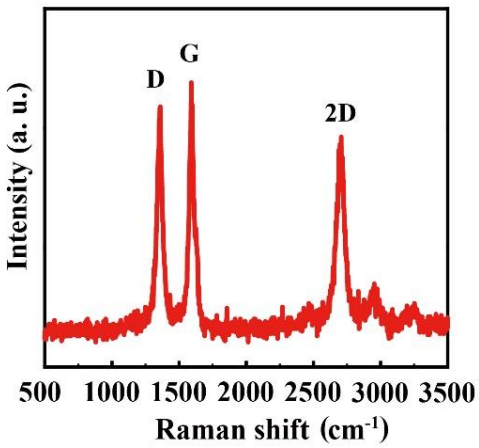

Figure S4. Raman spectrum of LIG grown from a PI film.

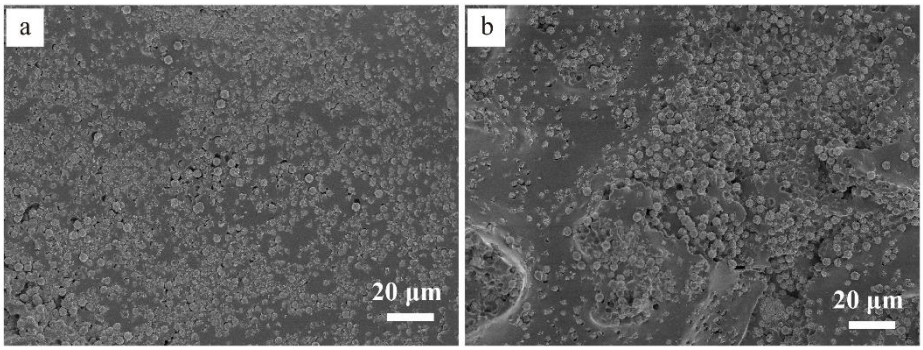

Figure S5. SEM images of the 3 µm-AgMF on PDMS layer template using (a) #1200 and (b) #400 sandpapers.

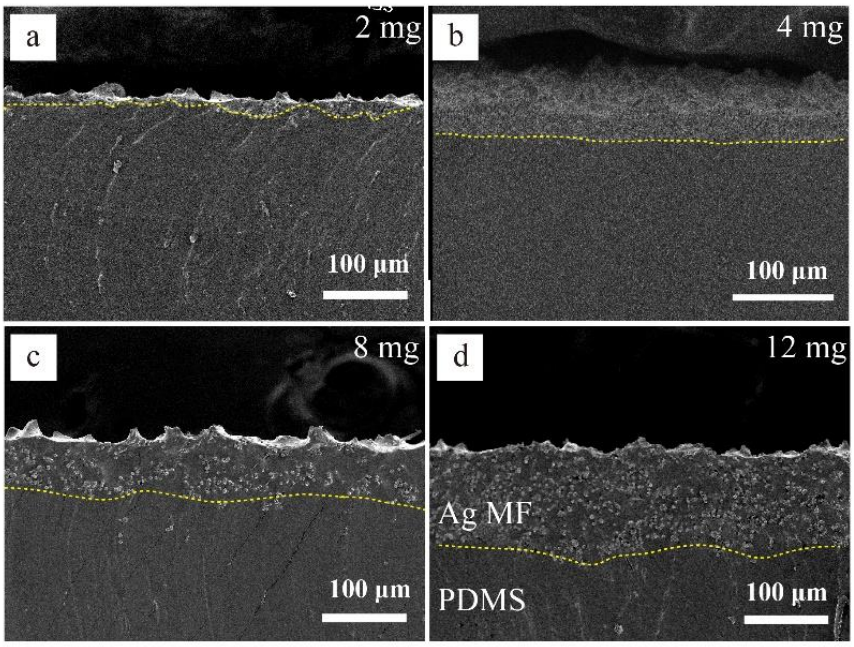

Figure S6. Cross-sectional SEM of 3 µm-AgMF on PDMS templated using #800 sandpaper with different loading of AgMFs.

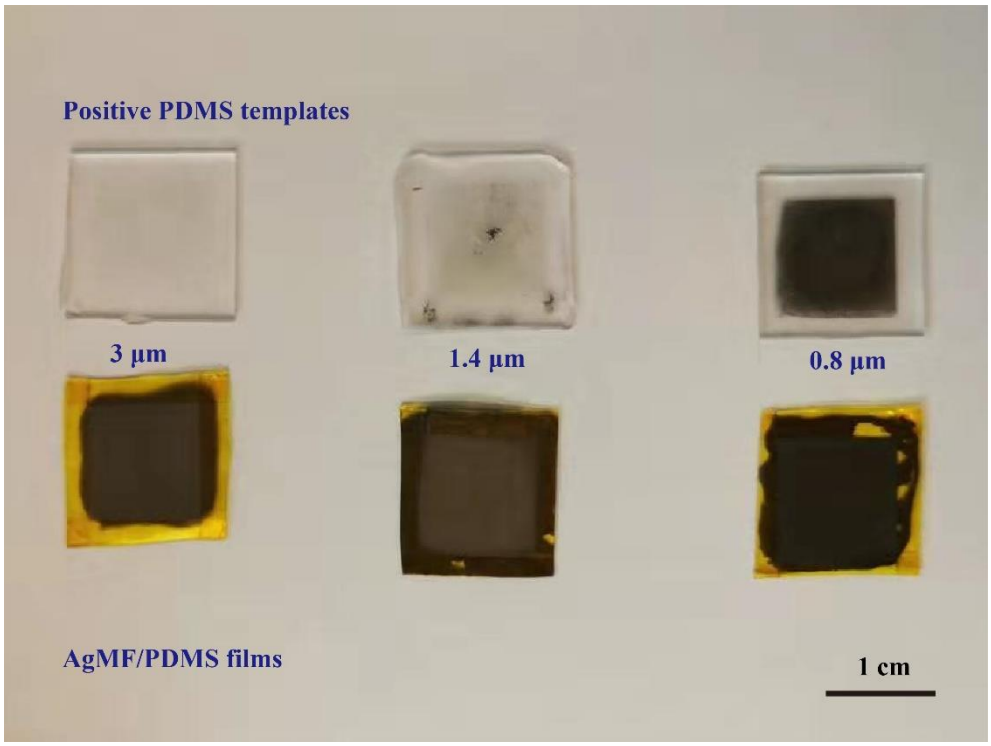

Figure S7. Photos illustrating the difficulty in producing a continuous AgMF after peel-off from the PDMS template. Samples use #800 sandpaper and 12 mg of AgMF loading. The valuable test is the diameter of PS microspheres, namely 3, 1.4, and 0.8 micrometers. The first row is the PDMS templates after peel-off. The second row is the resultant AgMF/PDMS layers, showing that only 3 µm PS diameter produces a continuous film (hence used in this work).

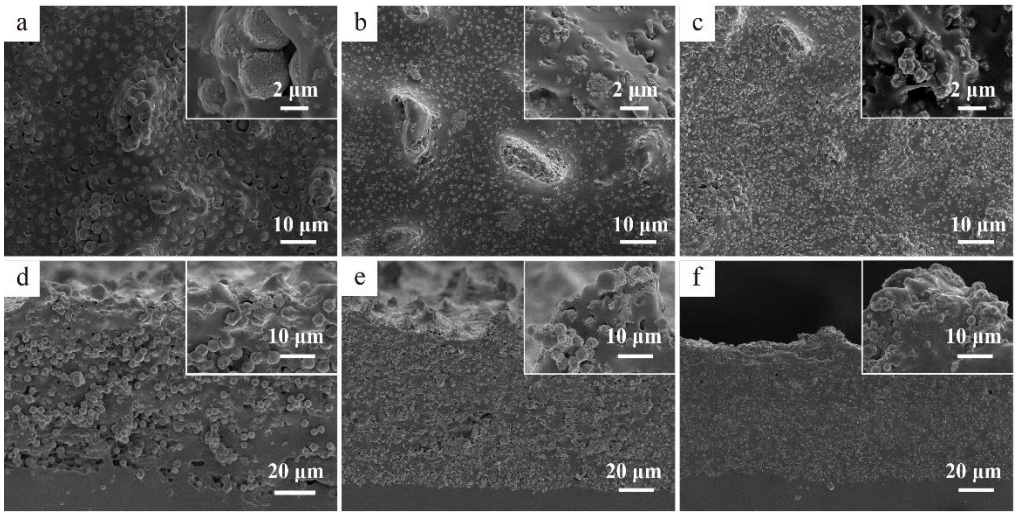

Figure S8. SEM images of (a-c) surface and (d-f) cross-section of the AgMFs/PDMS layer at a loading of 12 mg AgMF. Samples were produced from (a, d) 3 µm, (b, e) 1.4 µm, and (c, f) 0.8 µm PS microspheres.

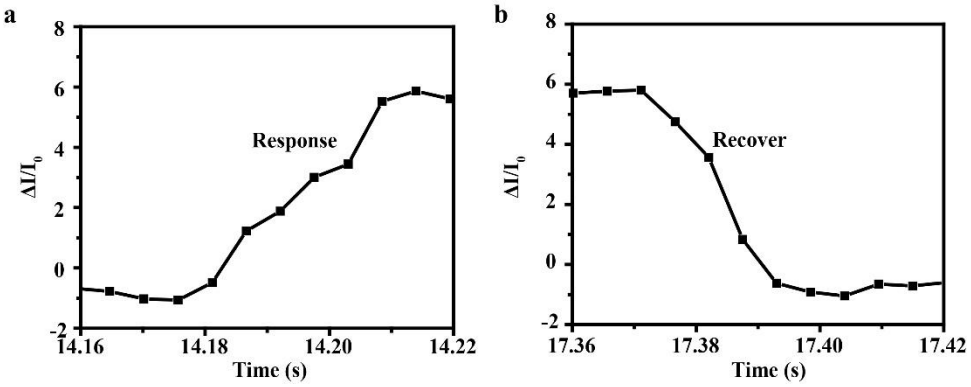

Figure S9. Detailed view of sensor dynamics presented in Figure 3b: (a) response and (b) recovery.

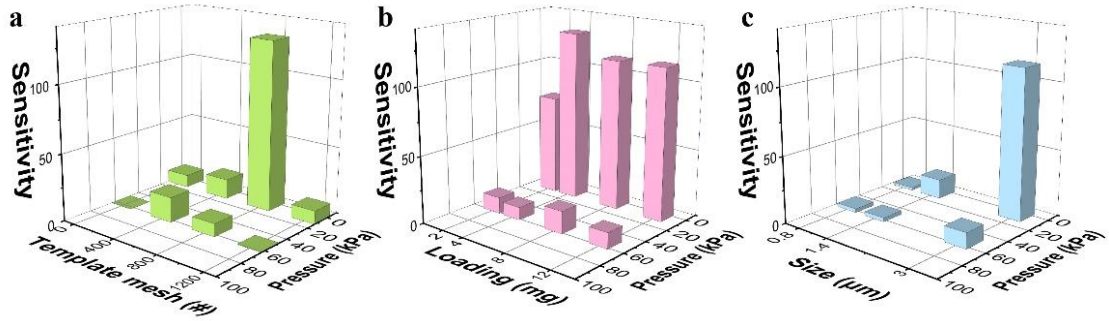

Figure S10. Scheme of the sensitity of the fabricated pressure sensor on different parameters (a) template mesh, (b) AgMF loading, (c) AgMF size.

Table S1. Sensitivity and linearity of the as-prepared sensors fabricated based on various design parameters.

No.	Type(template-loading-size*)	Sensitivity (kPa^{-1})		Linearity with a correlation coefficient	
		0~10 kPa	10~100 kPa	0~10 kPa	10~100 kPa
1	Flat-4-3	9.39	0.04	0.86	0.95
2	#400-4-3	14.9	18.6	0.87	0.95
3	#800-4-3	127	9.54	0.96	0.96
4	#1200-4-3	9.98	0.41	0.99	0.95
5	#800-2-3	74.4	12.1	0.99	0.90
6	#800-8-3	112	16.7	0.95	0.78
7	#800-12-3	113	11.8	0.76	0.77
8	#800-12-1.4	14.7	2.91	0.71	0.81
9	#800-12-0.8	1.94	2.80	0.80	0.99

* Loading and size are in units of mg and μm, respectively.