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

The Synergistic Effect of Topography and Stiffness as a Crack Engineering Strategy for Stretchable Electronics

*Sara Mechael, Gloria M. D'Amaral, Yunyun Wu, Kory Schlingman, Brittany Ives, R. Stephen Carmichael, and Tricia Breen Carmichael**

Department of Chemistry and Biochemistry, University of Windsor, Windsor, Ontario, Canada N9B 3P4

*Email: tbcarmic@uwindsor.ca

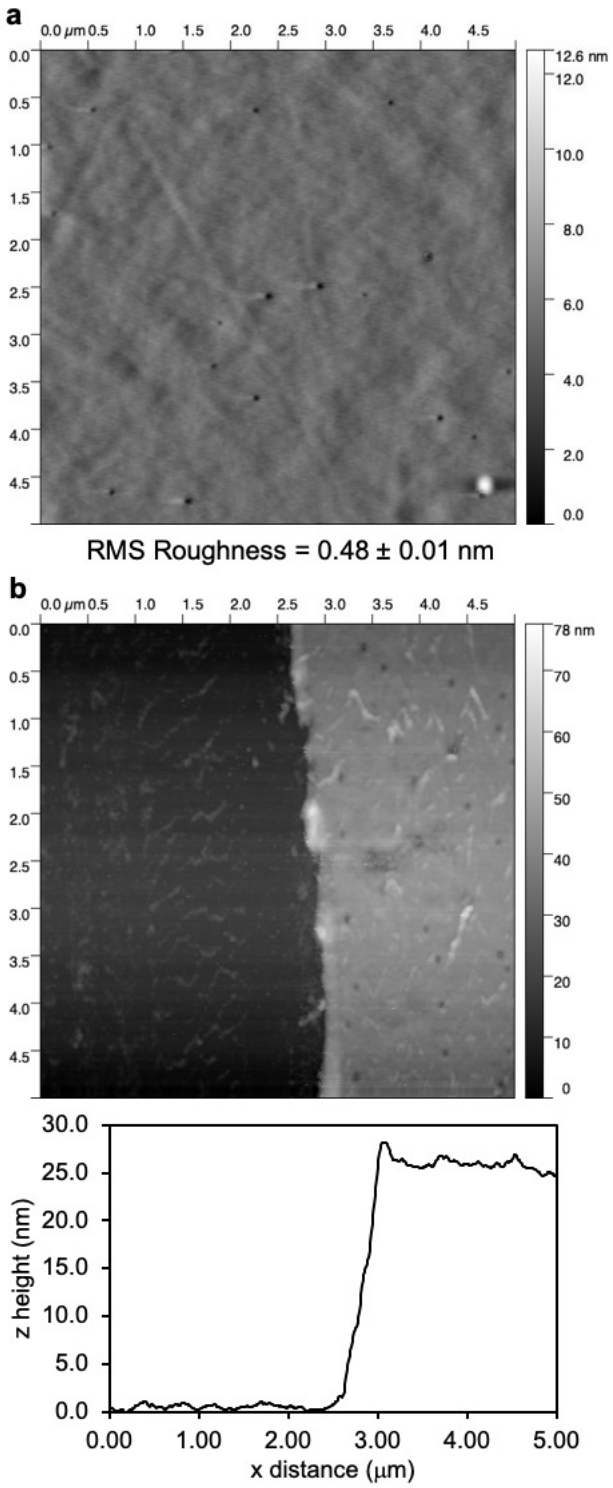

Figure S1. AFM characterization of PDMS/PVAc$_{planar}$. **(a)** AFM image of the PDMS/PVAc$_{planar}$ surface, **(b)** AFM image of a PVAc film step on glass with the corresponding plot of the film thickness.

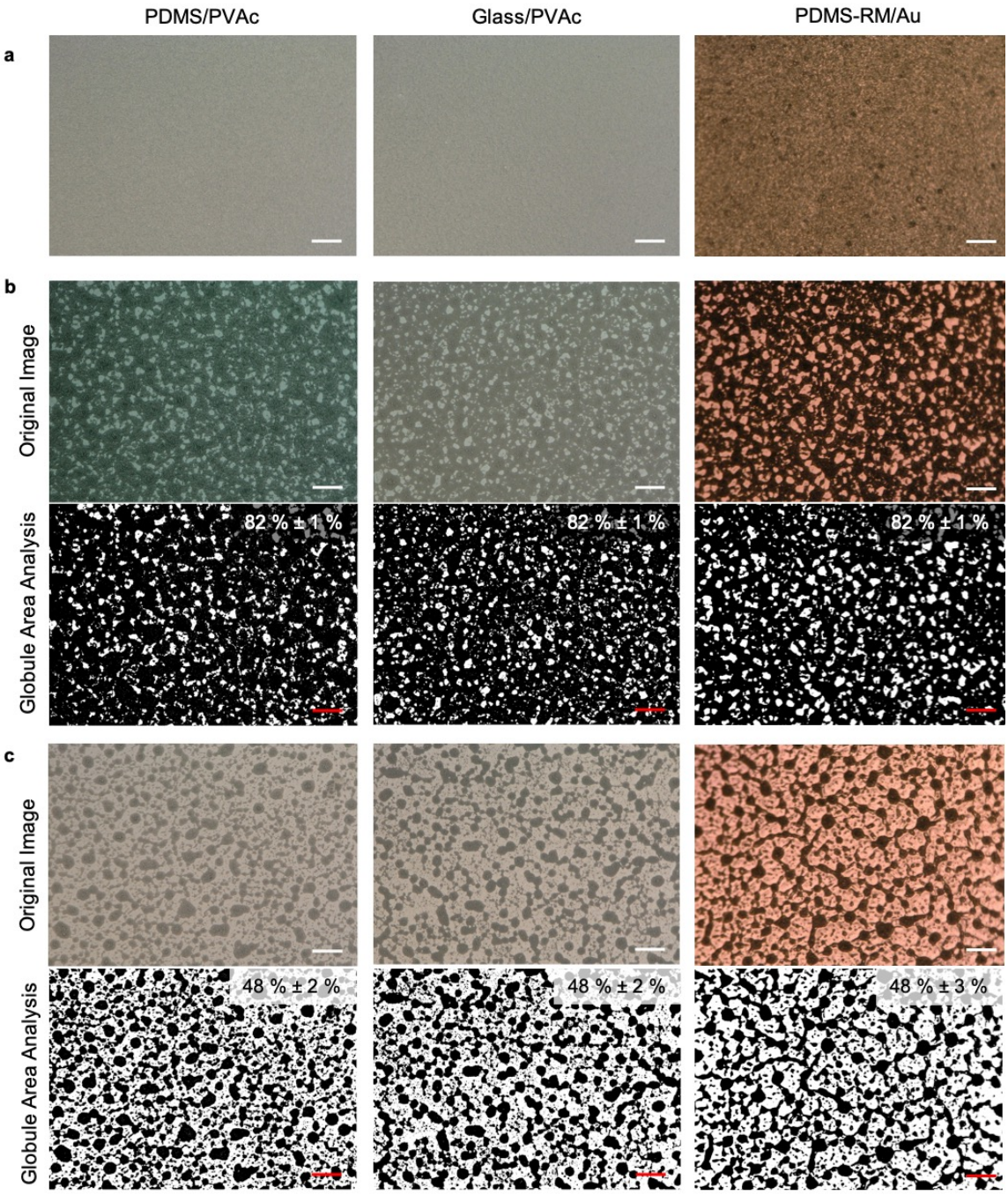

Figure S2. Optical microscope images and the corresponding image analysis showing topographical coverage in PDMS/PVAc, glass/PVAc, and PDMS-RM/PVAc when the samples are prepared from PVAc dilutions of (a) 1:1, (b) 3:1, and (c) 5:1 water:glue (v:v). Scale bars are 50 μm.

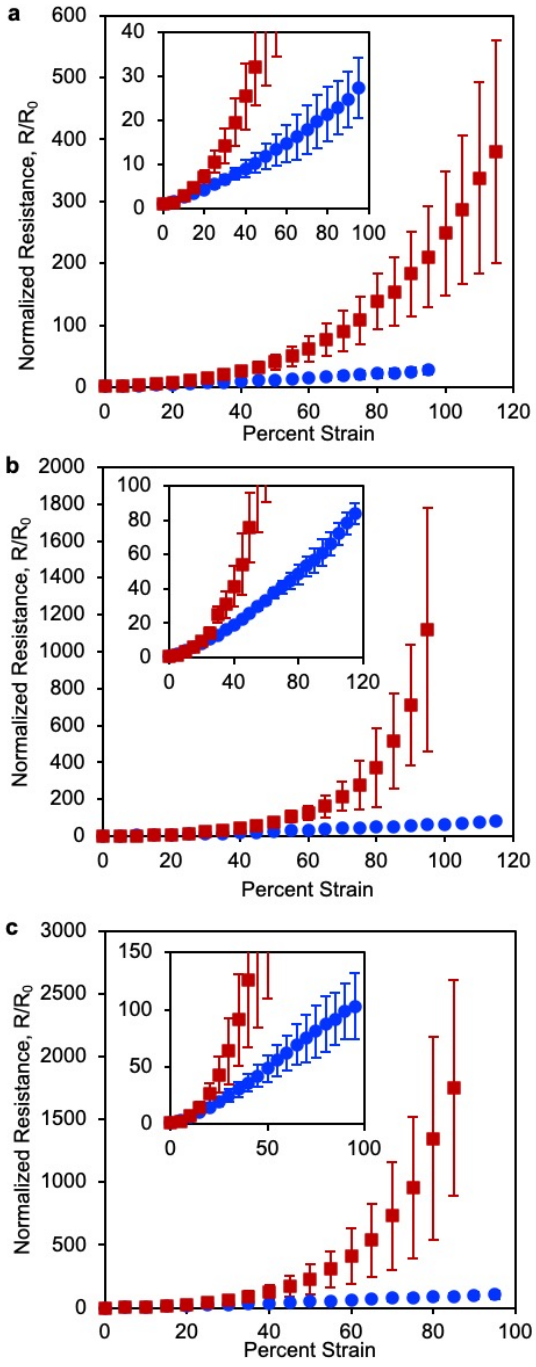

Figure S3. Plots of change in resistance with elongation of PDMS/PVAc/Au (red squares) and PDMS-RM/Au (blue circles) systems with **(a)** 100%, **(b)** 82%, and **(c)** 48% topographical coverage. Data points in the plots represent average R/R_0 ± standard deviation of at least 3 samples.

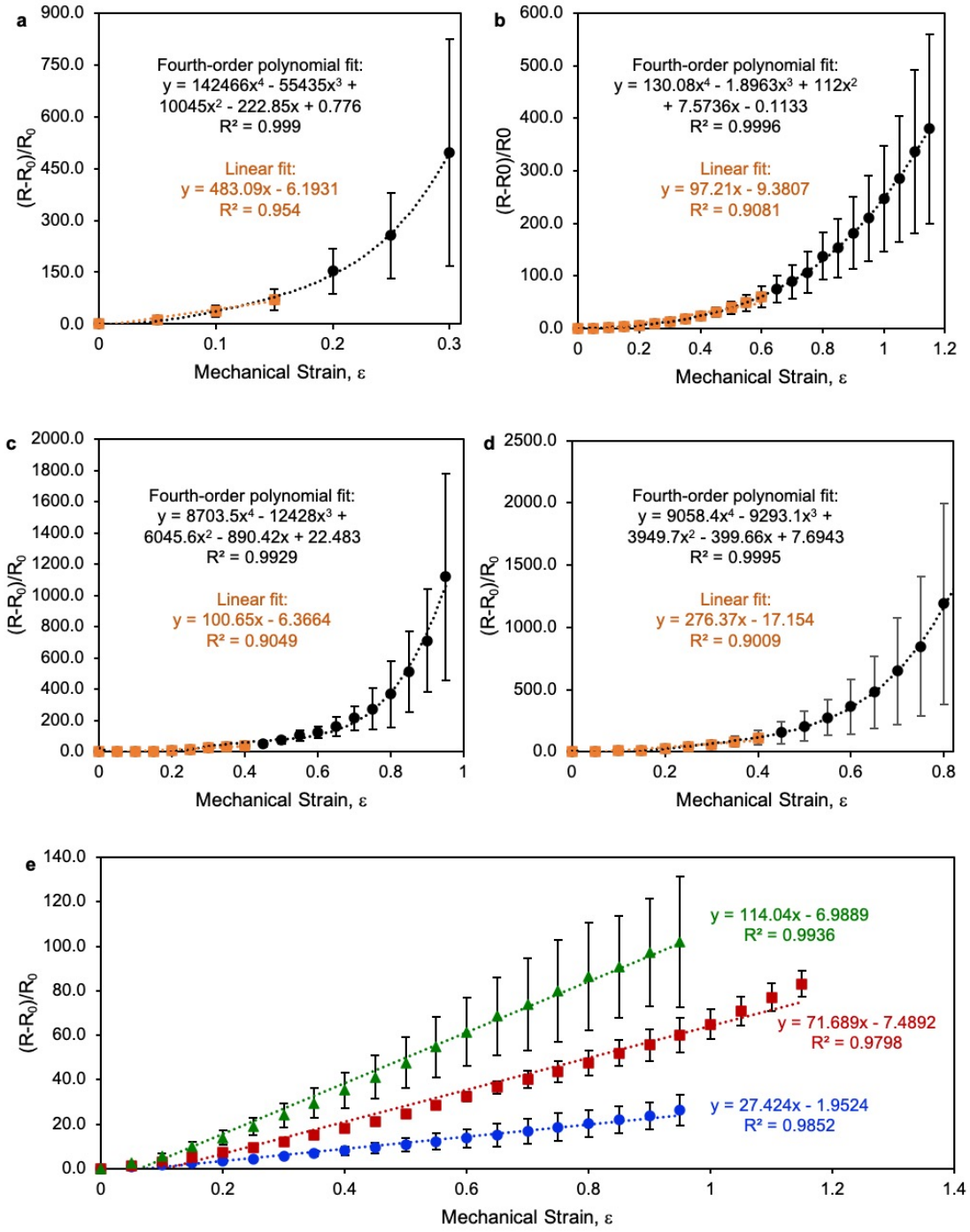

Figure S4. Plots and fits of $(R-R_0)/R_0$ with increasing mechanical strain of **(a)** PDMS/PVAc$_{planar}$/Au, **(b)** PDMS-RM$_{100}$/Au **(c)** PDMS-RM$_{82}$/Au, **(d)** PDMS-RM$_{48}$/Au, and **(e)** PDMS/PVAc/Au with 100% PVAc coverage (blue circles), 82% PVAc coverage (red squares),

and 48% PVAc coverage (green triangles). Data points in the plots represent average $R/R_0 \pm$ standard deviation of at least 3 samples.

Table S1. Gauge factors and working ranges of reported strain sensing systems

Sensor Material	Gauge Factor	Linear Working Range	Reference
PDMS/$PVAc_{48}$/Au	114	0 – 95 %	This work
PDMS/$PVAc_{82}$/Au	72	0 – 100 %	This work
PDMS/$PVAc_{100}$/Au	27	0 – 95 %	This work
Au film on nitrile butadiene rubber	62	0 – 40 %	Mechael, S., *et al.*[1]
AuNPs on PDMS	2.05	0 – 20 %	Lee, J., *et al.*[2]
Au film on PET	1600	0 – 2 %	Lee, T., *et al.*[3]
AgNWs on latex	6.9	0 – 50 %	Gong, S., *et al.*[4]
AgNWs on PDMS	5	0 – 60 %	Amjadi, M., *et al.*[5]
AgNWs on PDMS	24.6	0 – 130 %	Kim, K-H, *et al.*[6]
ZnO NWs on polystyrene	116	0 – 50 %	Xiao, X., *et al.*[7]
CNT fibers on Ecoflex	0.56	0 – 200 %	Ryu, S., *et al.*[8]
CNTs on ecoflex	1.75	0 – 100 %	Amjadi, M., *et al.*[9]
CNTs on PDMS	0.82	0 – 40 %	Yamada, T., *et al.*[10]
Graphene nanoribbons on polyurethane	7.9	0 – 60 %	Tan, C., *et al.*[11]
Graphene nanocellulose paper	7.1	0 – 100 %	Yan, C., *et al.*[12]
Graphene foam	15	0 – 77 %	Jeong, Y. R., *et al.*[13]
Graphene foam PDMS	98.66	0 – 5 %	Li, J., *et al.*[14]
Reduced graphene oxide (rGO) polyethylenimine layered nanocomposite	754	0 – 5 %	Ye, X., *et al.*[15]
rGO-PDMS composite	7.2	0 – 110 %	Zheng, Z., *et al.*[16]
Graphene/carbon black/Ni sponge	138	0 – 16 %	Sun, S., *et al.*[17]
Carbon black and PDMS	5.5	0 – 10 %	Kong, J-H., *et al.*[18]

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