Supporting Information

Optimized CNT-PDMS Flexible Composite and its Application in Attachable Health-care Device

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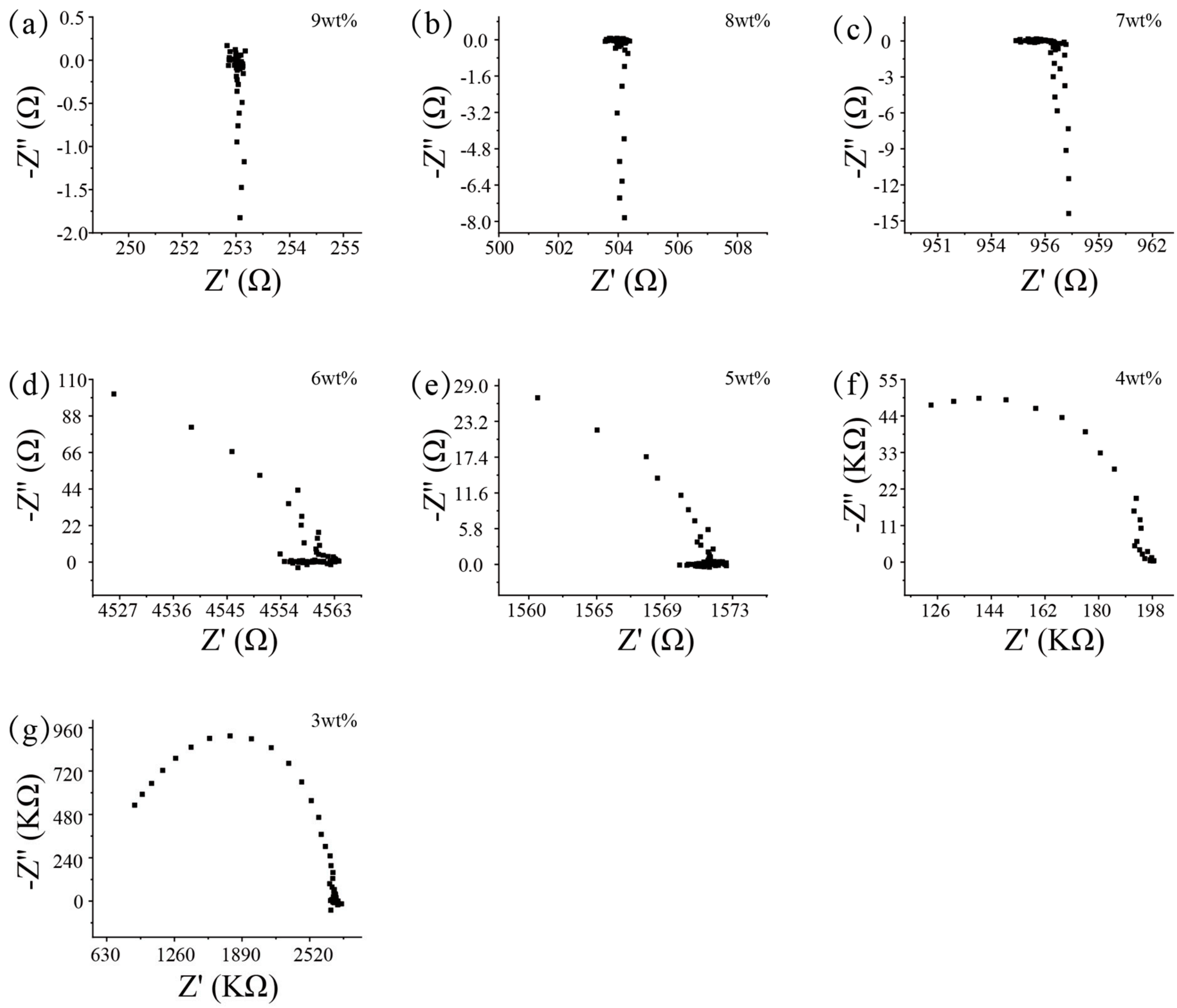


Figure. S1. (a-g) Impedance analysis of CNT-PDMS composite with different CNT mass fraction: (**a**) 9 wt% CNT-PDMS; (**b**) 8 wt% CNT-PDMS; (**c**) 7 wt% CNT-PDMS; (**d**) 6 wt% CNT-PDMS; (**e**) 5 wt% CNT-PDMS; (**f**) 4 wt% CNT-PDMS (**g**) 3 wt% CNT-PDMS.

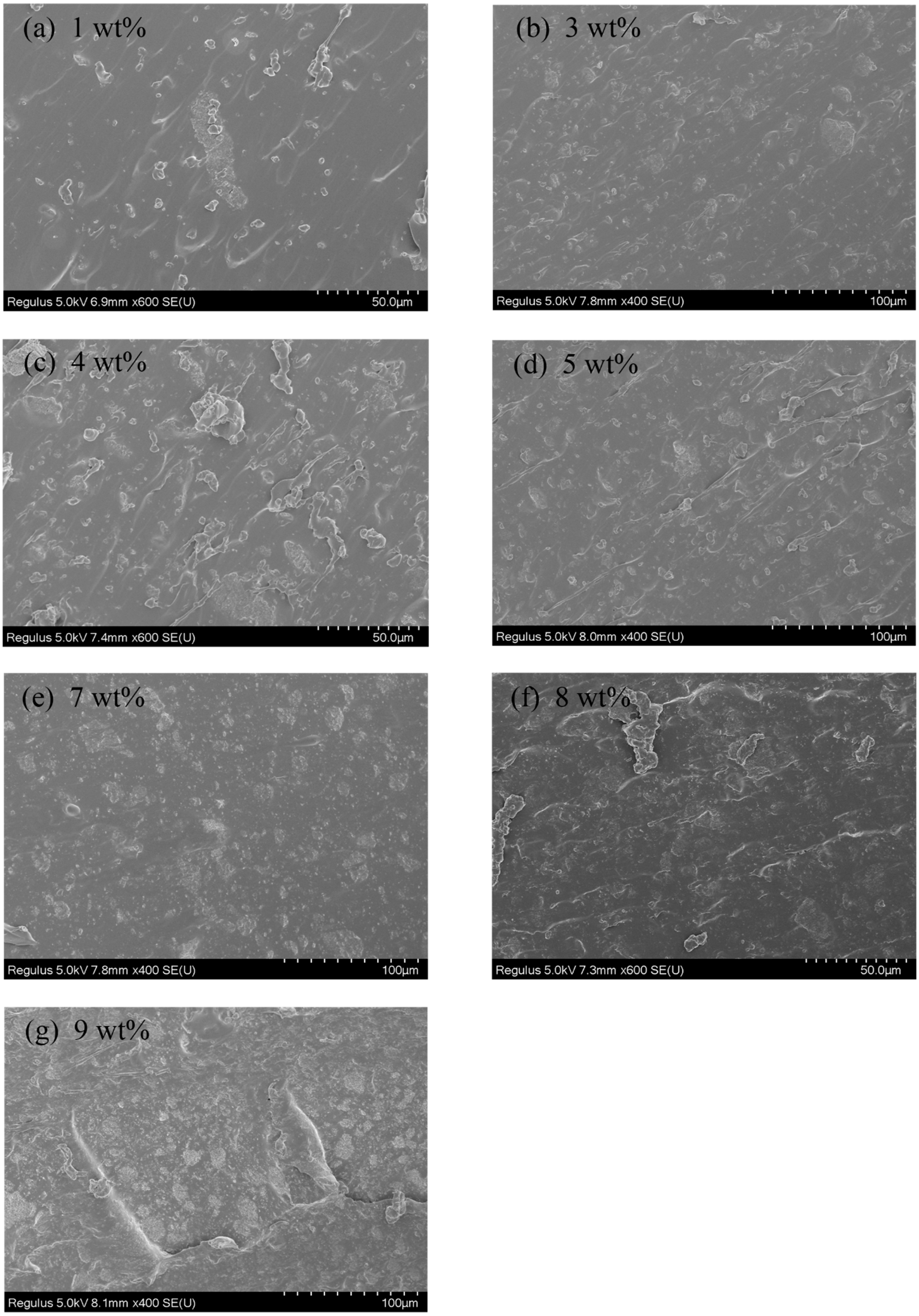
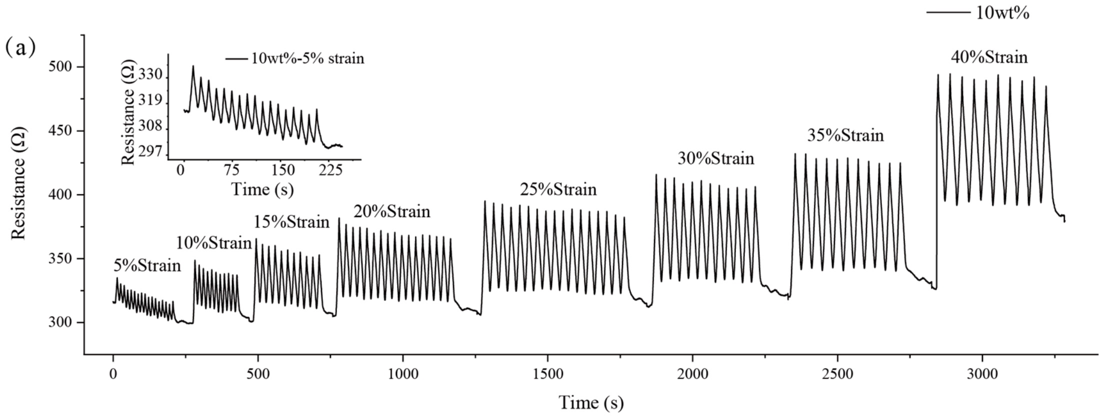
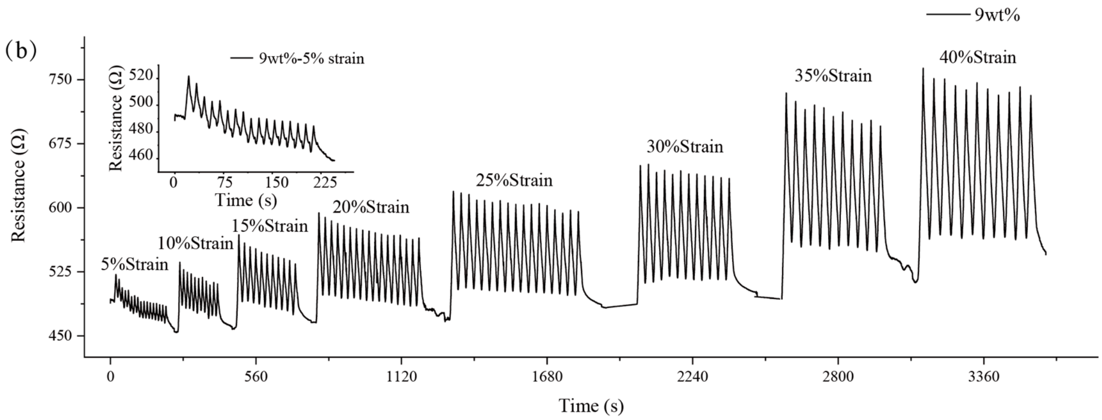
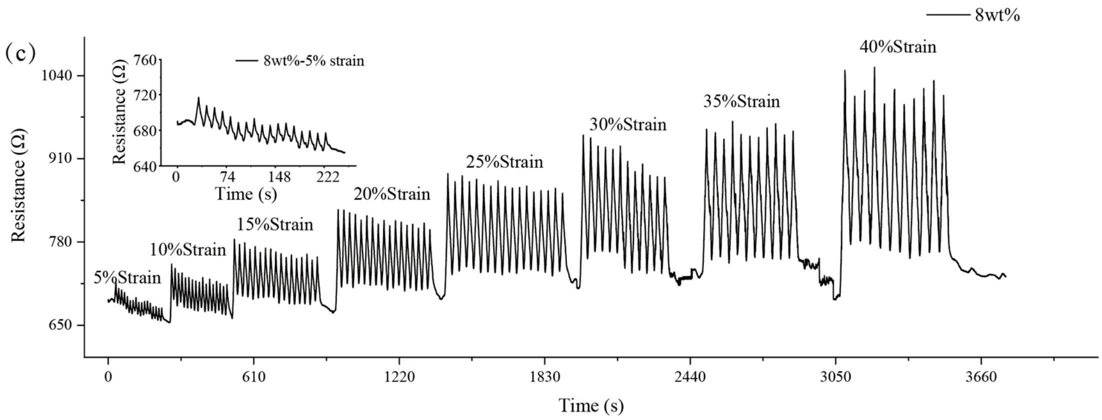
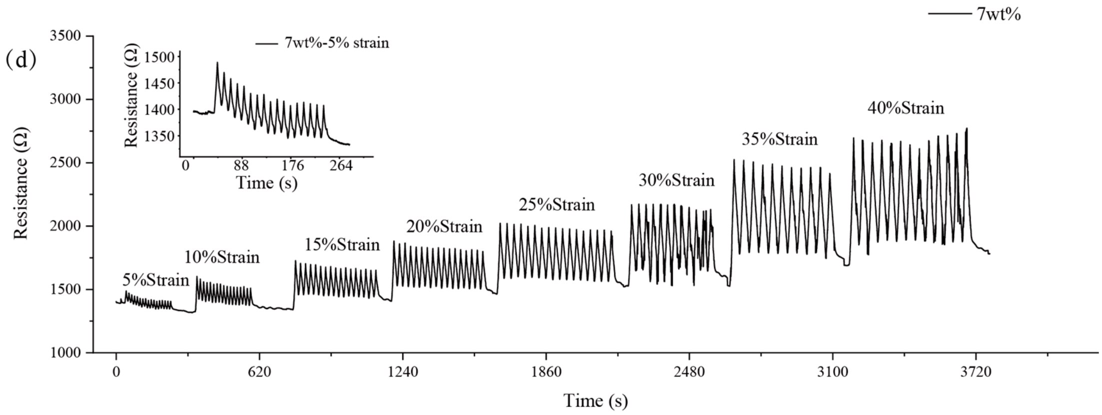

(a) 1 wt%
Regulus 5.0kV 6.9mm x600 SE(U)
50.0µm
(b) 3 wt%
Regulus 5.0kV 7.8mm x400 SE(U)
100µm
(c) 4 wt%
Regulus 5.0kV 7.4mm x600 SE(U)
50.0µm
(d) 5 wt%
Regulus 5.0kV 8.0mm x400 SE(U)
100µm
(e) 7 wt%
Regulus 5.0kV 7.8mm x400 SE(U)
100µm
(f) 8 wt%
Regulus 5.0kV 7.3mm x600 SE(U)
50.0µm
(g) 9 wt%
Regulus 5.0kV 8.1mm x400 SE(U)
100µm

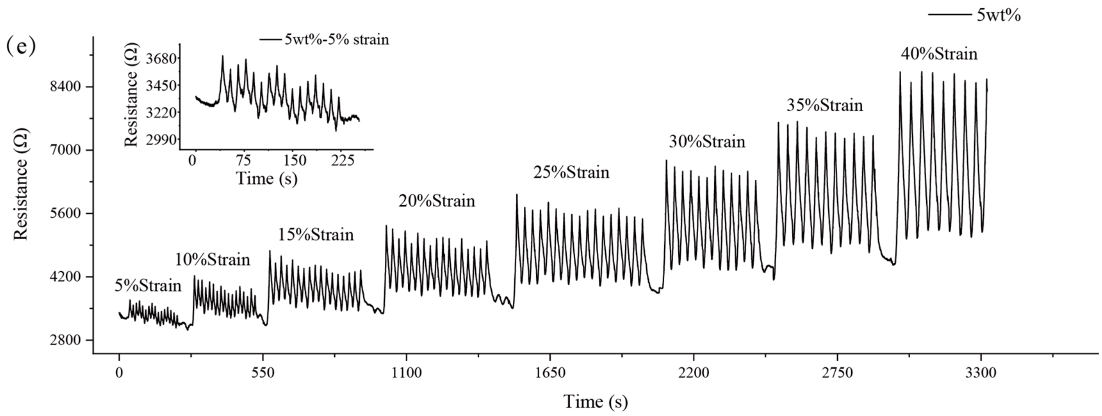
Figure. S2.(a-g) SEM image of CNT-PDMS composites with different weight ratio: (**a**) 1 wt% CNT-PDMS; (**b**) 3 wt% CNT-PDMS; (**c**) 4 wt% CNT-PDMS; (**d**) 5 wt% CNT-PDMS; (**e**) 7 wt% CNT-PDMS; (**f**) 8 wt% CNT-PDMS (**g**) 9 wt% CNT-PDMS.

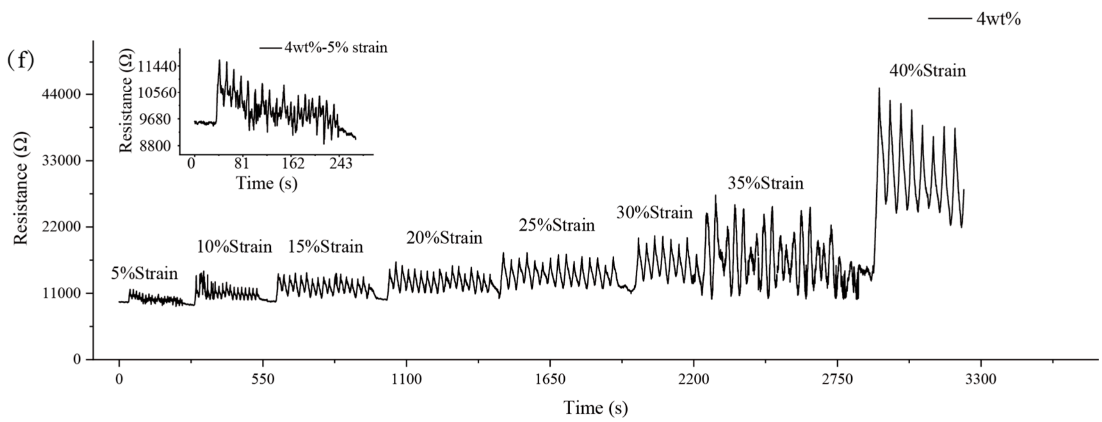







(d)
7wt%
7wt%-5% strain
Resistance (Ω)
1500
1450
1400
1350
0
88
176
264
Time (s)
3500
3000
2500
2000
1500
1000
0
620
1240
1860
2480
3100
3720
Time (s)
5%Strain
10%Strain
15%Strain
20%Strain
25%Strain
30%Strain
35%Strain
40%Strain


(e)
5wt%
5wt%-5% strain
Resistance (Ω)
3680
3450
3220
2990
0
75
150
225
Time (s)
8400
7000
5600
4200
2800
0
550
1100
1650
2200
2750
3300
Time (s)
5%Strain
10%Strain
15%Strain
20%Strain
25%Strain
30%Strain
35%Strain
40%Strain


(f)
4wt%
4wt%-5% strain
Resistance (Ω)
11440
10560
9680
8800
0
81
162
243
Time (s)
44000
33000
22000
11000
0
0
550
1100
1650
2200
2750
3300
Time (s)
5%Strain
10%Strain
15%Strain
20%Strain
25%Strain
30%Strain
35%Strain
40%Strain

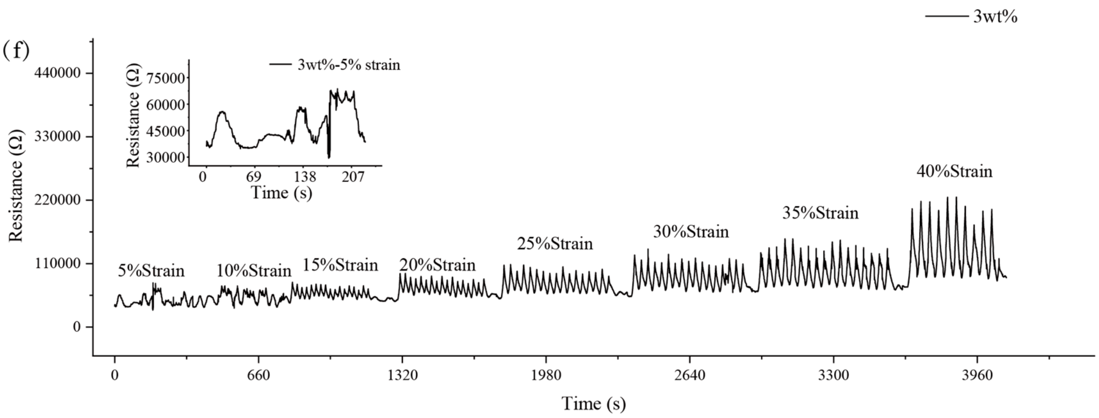


Figure. S3. (a-g) resistance change curves of different CNT mass fraction CNT-PDMS samples during stretching: (**a**) 10 wt% CNT-PDMS; (**b**) 9 wt% CNT-PDMS; (**c**) 8 wt% CNT-PDMS; (**d**) 7 wt% CNT-PDMS; (**e**) 5 wt% CNT-PDMS; (**f**) 4 wt% CNT-PDMS (**g**) 3 wt% CNT-PDMS.

Table 1. Performance comparison table of flexible sensors with different materials.

Material	**Blending method**	**Sensitivity/ Gauge factor**	**Linear range**	**Toxicity**	**Ref.**
15wt% CNT/ETC-PTHF	Organic solvent method	Max. 8900	Not shown	Not sure	[1]
7% MWCNT/PDMS	Organic solvent method	5 - 9	0% - 40% strain	little pentane left in the mixture	[2]
CB-TPU* (25 wt%)	evaporation organic solvent	2.56	0% - 1% strain	None	[3]
Graphene based on stretchable yarns	ayer-by-layer assembly technique	Not shown	0% - 150% strain	Not sure	[4]
TPU/CNT–CNC	Complex method	321	> 500% strain	Not sure	[5]
GnPs/epoxy**	ultrasonic and the ball mill mixing	22.54	0% - 1.2% strain	Not sure	[6]
This work (8%wt CNT-PDMS)	dry blending	1.2097	0% - 40% strain	Good biocompatibility	-

*CB-TPU = Carbon black nanoparticles - Thermoplastic polyurethane

**GnPs/epoxy = graphene platelets /epoxy

References:

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