

## **Electronic Supplementary Information (ESI) for**

### **Electrically Conductive Thermoplastic Elastomer Nanocomposites at Ultralow Graphene Loading Levels for Strain Sensor Applications**

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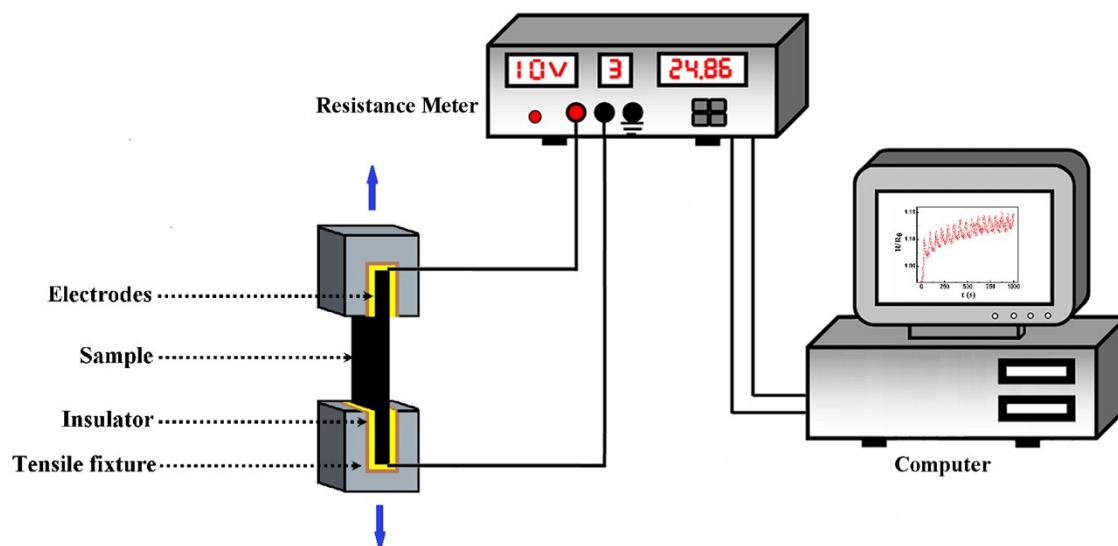
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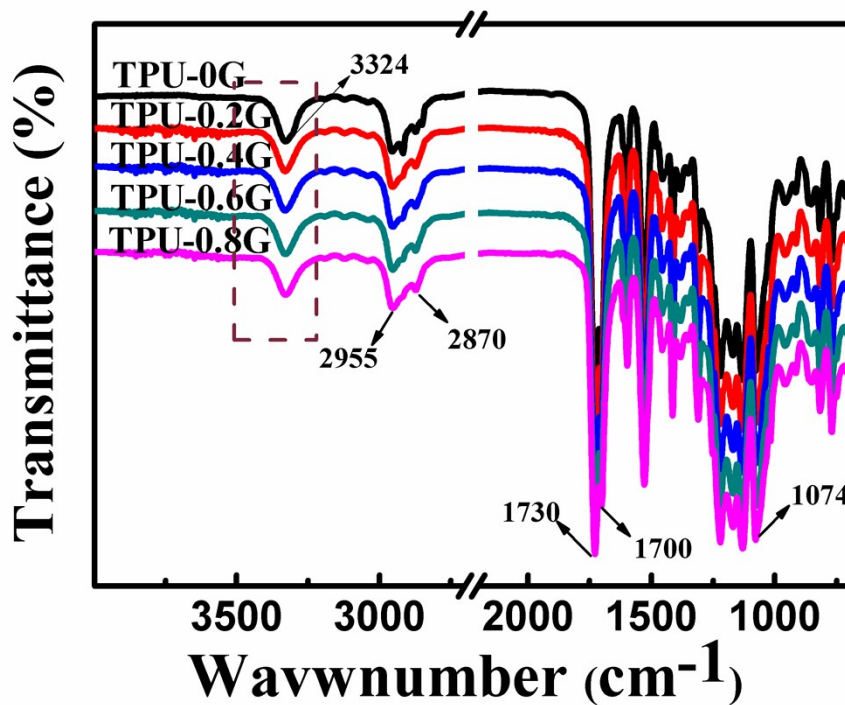
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E-mail addresses: [kundai@zzu.edu.cn](mailto:kundai@zzu.edu.cn) (K. D.),

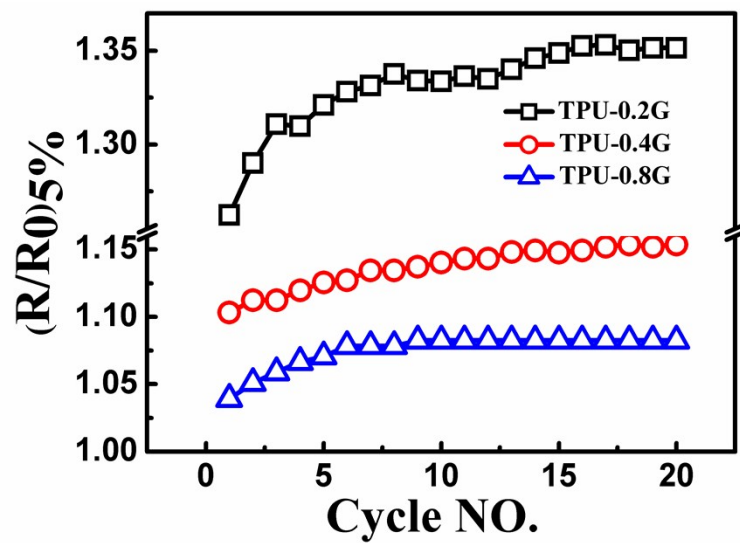
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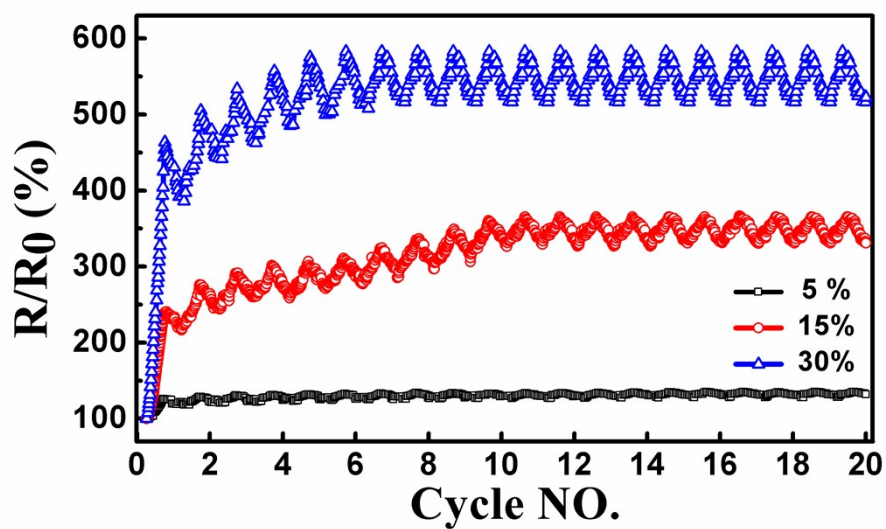
**Fig. S1** Set-up for the simultaneous strain sensing upon cyclic loading (the blue arrows represent the tensile direction).



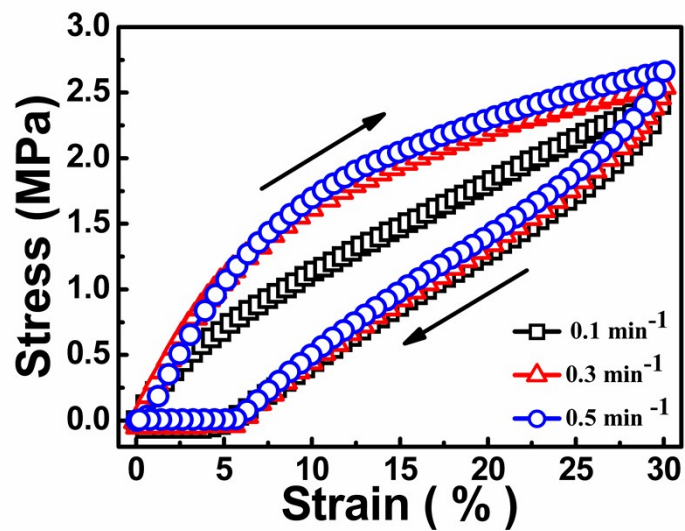
**Figure S2.** FT-IR spectra of neat TPU and its graphene nanocomposites with different graphene contents.



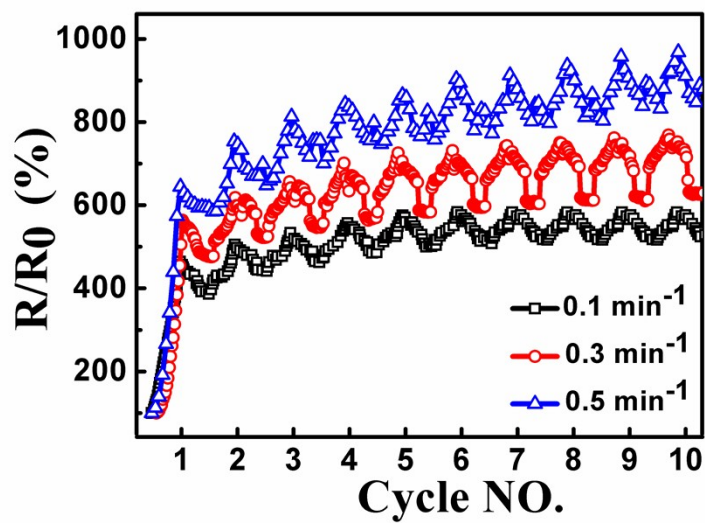
**Fig. S3** The change of  $(R/R_0)_{5\%}$  as a function of cycle number.



**Fig. S4** Resistance-strain behavior of TPU-0.2G, up to different strain amplitude at the strain rate of  $0.1 \text{ min}^{-1}$ , during cyclic loading (cycle 1-20).



**Fig. S5** Stress-strain behavior of TPU-0.2G at three strain rates during the first cyclic strain test.



**Fig. S6** Resistance-strain behavior of TPU-0.2G, up to 30% strain at different strain rates, during cyclic loading (cycle 1-10).

**Table S1** Parameters obtained by fitting the experimental data with Equation 7.

	A	B	C	M	W	U	V
0.1 min <sup>-1</sup>	1.44369	1.46983	0.01855	2.6126	0.10596	0.10596	0.10596
0.3 min <sup>-1</sup>	1.46331	1.4976	0.02077	2.75045	0.36768	0.36768	0.36768
0.5 min <sup>-1</sup>	1.38308	1.37605	0.07108	2.81029	0.34792	0.34792	0.34792