

Supporting Information

Graphene oxide-stimulated acoustic attenuating performance of Tungsten based Epoxy films

Yunfeng Qiu,^{a†} JingJing Liu,^{a†} Huihui Yang,^a Feng Gao,^a Yue Lu,^a Rui Zhang,^{*b} Wenwu
Cao,^{*b,c} PingAn Hu^{*a}

^a Key Lab of Microsystem and Microstructure, Harbin Institute of Technology, Ministry of Education, No. 2 YiKuang Street, Harbin, 150080, P.R. China

^b Condensed Matter Science and Technology Institute, Harbin Institute of Technology, Harbin 150080, China

^c Department of Mathematics and Materials Research Institute, The Pennsylvania State University, University Park, Pennsylvania 16802, USA

† Qiu. Y. and Liu. J. contributed equally to this work.

Table S1. The mass loss of W, epoxy, GO and W/E/GO/E composite materials.

Sample	Mass ratio (W:E:GO:E)	GO content (wt %)	E content (wt %)	Expected Mass loss (wt %)	Mass loss (wt %)
E	_____	0	100	_____	80.87
GO	_____	100	0	_____	71.86
W/E/GO/E (a)	60:1:3.5:0.1	5.42	1.55	5.27	2.97
W/E/GO/E (b)	60:3:3.5:0.1	5.26	4.51	7.53	5.85
W/E/GO/E (c)	60:5:3.5:0.1	5.11	7.30	9.67	9.31

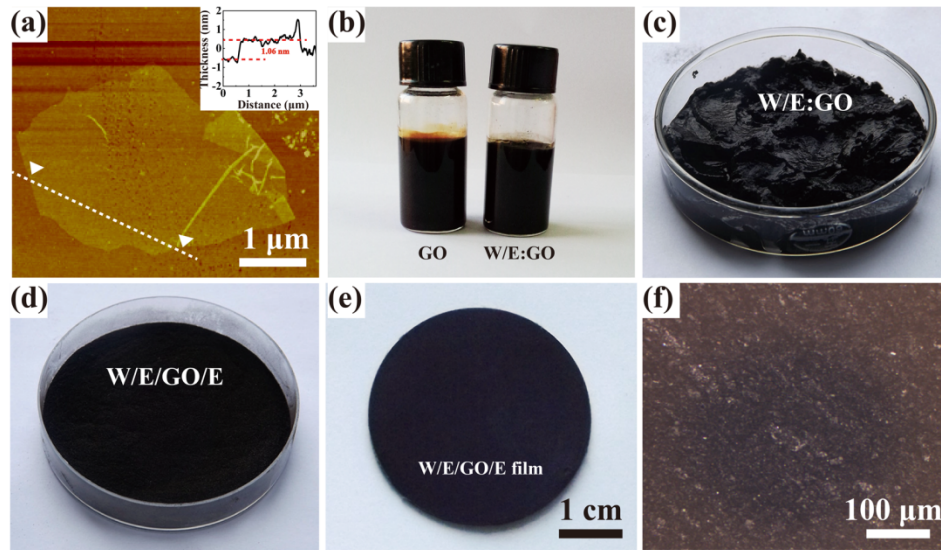
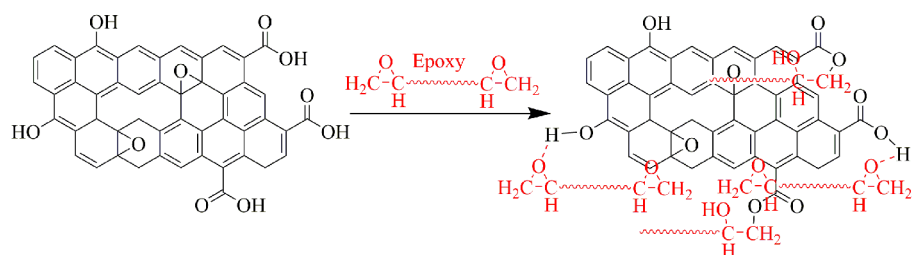


Figure S1. (a) AFM image of GO nanosheets on Si substrate. The inset of (a) is the height profile of the white dotted line. (b) The comparison of pure GO and W/E spheres loaded GO aqueous solutions. (c) The photograph of the wet W/E/GO composite precursor. (d) The dried powder of W/E/GO/E. (e) W/E/GO/E film with 2 mm thickness. (f) The optical image of the film's surface.



Scheme S1. Possible hydrogen bonds and chemical bonds between the epoxy resin and GO.

Table S2. Failure stress and strain, impedance, and attenuation of W, W/E and W/E/GO/E films.

Films	W/E (Wt %)	GO (Wt %)	Epo xy (Wt %)	Failu re stress (MP a)	Stra in (%)	Impeda nce (MRayl)	Attenuatio n (dB/cm*M Hz)
W	60/0	0	40	54	2.8	5.4	9.0
W/E	60/5	0	35	87	1.8	5.6	6.5
W/E/G O/E	60/5	3.5	31.5	21	8.5	5.5	36.5

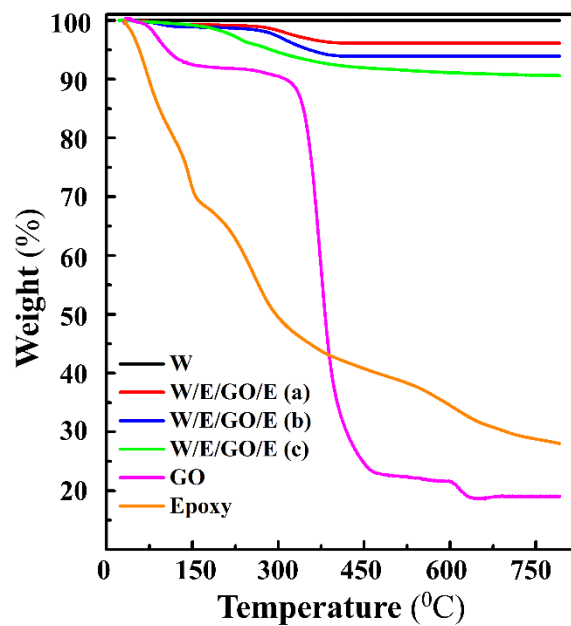


Figure S2. Thermogravimetric curves for W, epoxy, GO and W/E/GO/E composite materials. The mass ratio of W:E:GO:E in (a), (b) and (c) are 60:1:3.5:0.1, 60:3:3.5:0.1, and 60:5:3.5:0.1, respectively.

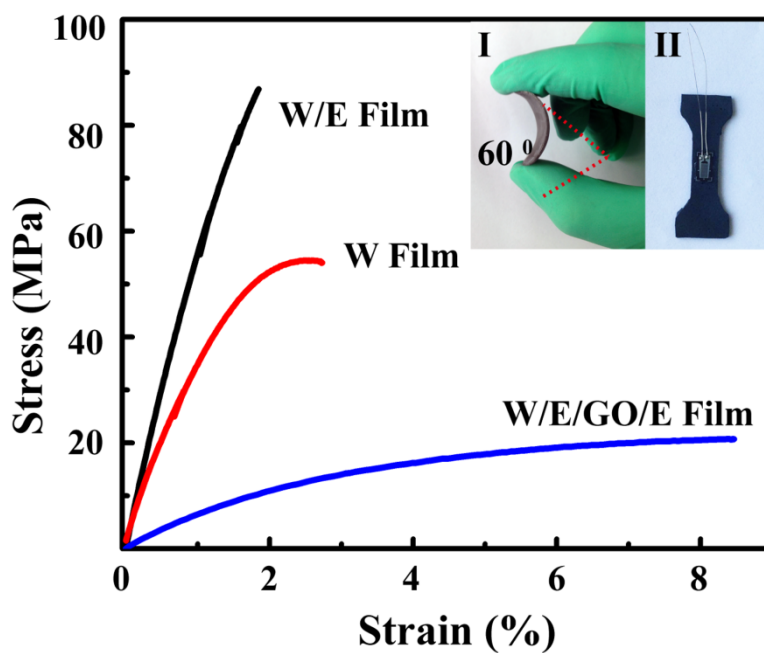


Figure S3. Stress-strain curves of W, W/E, W/E/GO/E films. The inset I shows the deformability of W/E/GO/E film. The inset II shows the dumbbell shape of specimen for stress-strain measurements.

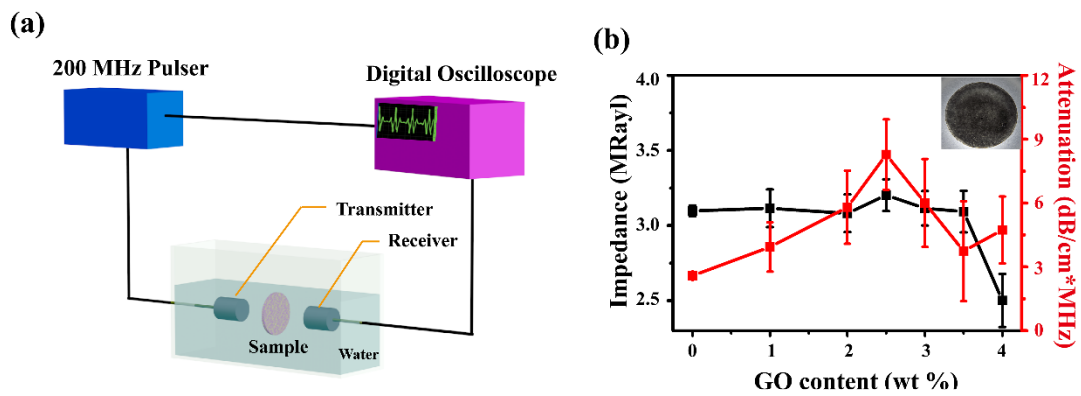


Figure S4. (a) The pulse-echo immersion technique used to measure the acoustic performance of our composite films. (b) The acoustic impedance and attenuation versus GO contents for GO/E films.