

Supporting Information

Novel 3D Network Architected Hybrid Aerogel Comprising Epoxy, Graphene, and Hydroxylated Boron Nitride Nanosheets

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properties*

Table S1. Formulation and density of EP/GNS and EP/GNS/BNOH hybrid aerogels.

Aerogel sample	Formulations				Density (g/cm ³)
	BDGE/TETA/ H ₂ O	GO dispersion	BNOH dispersion	NaC solution	
	(ml/ml/ml)	(ml)	(ml)	(g)	
EP/GNS-1	0.28/0.07/7	7	NA	0.7	0.0767
EP/GNS-2	0.56/0.14/7	7	NA	0.7	0.1396
EP/GNS-3	1.12/0.28/7	7	NA	0.7	0.2785
EP/GNS/BNOH-1	0.28/0.07/7	4.7	2.3	0.47	0.0699
EP/GNS/BNOH-2	0.56/0.14/7	4.7	2.3	0.47	0.1255
EP/GNS/BNOH-3	1.12/0.28/7	4.7	2.3	0.47	0.2847

The content of GNS in EP/GNS aerogels is 7.2, 4.9 and 2.3 wt.%, respectively, in EP/GNS-1, EP/GNS-2 and EP/GNS-3.

The content of (GNS+BNOH) in EP/GNS/BNOH aerogels is 7.2, 4.9 and 2.3 wt.%, respectively, in EP/GNS/BNOH-1, EP/GNS/BNOH-2 and EP/GNS/BNOH-3.

Description of each aerogel.

EP/GNS-1: Obtained dross mixture after hydrothermal treatment, which cannot support itself; Taken out of the reaction vessel after - 56°C freezing, and obtained aerogels by vacuum freeze drying and high-temperature curing.

EP/GNS-2: Same as EP/GNS-1.

EP/GNS-3: Obtained self-supporting cylindrical hydrogel directly after hydrothermal treatment; Taken out of the reaction vessel after - 56°C freezing, and obtained aerogels by vacuum freeze drying and high-temperature curing.

EP/GNS/BNOH-1: Obtained self-supporting cylindrical hydrogel directly after hydrothermal treatment; Taken out of the reaction vessel after - 56°C freezing, and obtained aerogels by vacuum freeze drying and high-temperature curing.

EP/GNS/BNOH-2: Same as EP/GNS/BNOH-1.

EP/GNS/BNOH-3: Same as EP/GNS/BNOH-1.

Density measurement and determination of the aerogel samples

The densities (ρ) of the monoliths could be obtained by the following method: ^{S1}

The density of aerogel can be determined from the mass weight divided by the volume. Herein, the averaged values of five aerogels were obtained in Table S1.

The volume (v) of the diced aerogel (see Figure S10) was calculated based on Eq. (E1)

$$v = l \times w \times h \quad (\text{E1})$$

l and w refers to the length and width of the diced aerogel at the top and bottom respectively, and h represents the height of aerogel. The densities ρ of aerogel samples were calculated from Eq. (E2)

$$\rho = m / v \quad (\text{E2})$$

m refers to the mass of the cylindrical shaped aerogel obtained by the precision balance.

The diced aerogel, shown in Figure S10, was obtained from the original aerogel, which was immersed into liquid nitrogen and then diced to relatively regular cube.

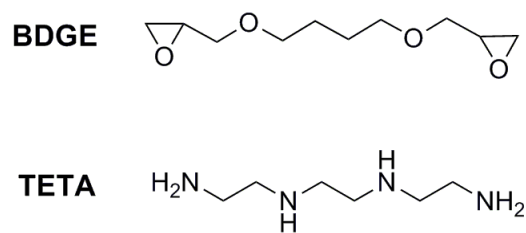


Figure S1. The chemical structure of BDGE and TETA.

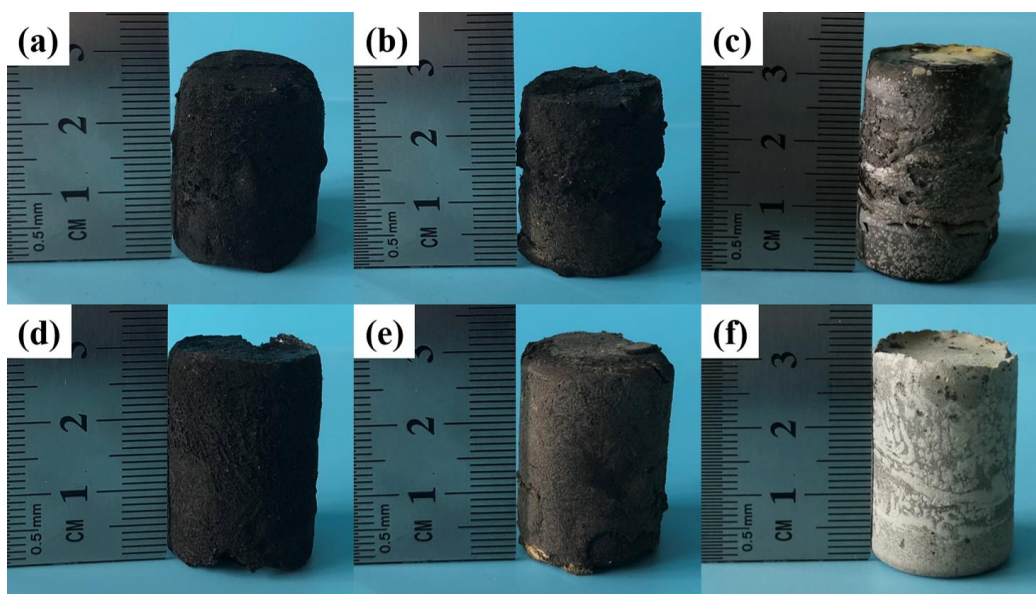


Figure S2. Digital photos of the as-prepared EP/GNS and EP/GNS/BNOH hybrid aerogels: (a) EP/GNS-1; (b) EP/GNS-2; (c) EP/GNS-3; (d) EP/GNS/BNOH-1; (e) EP/GNS/BNOH-2; (f) EP/GNS/BNOH-3.

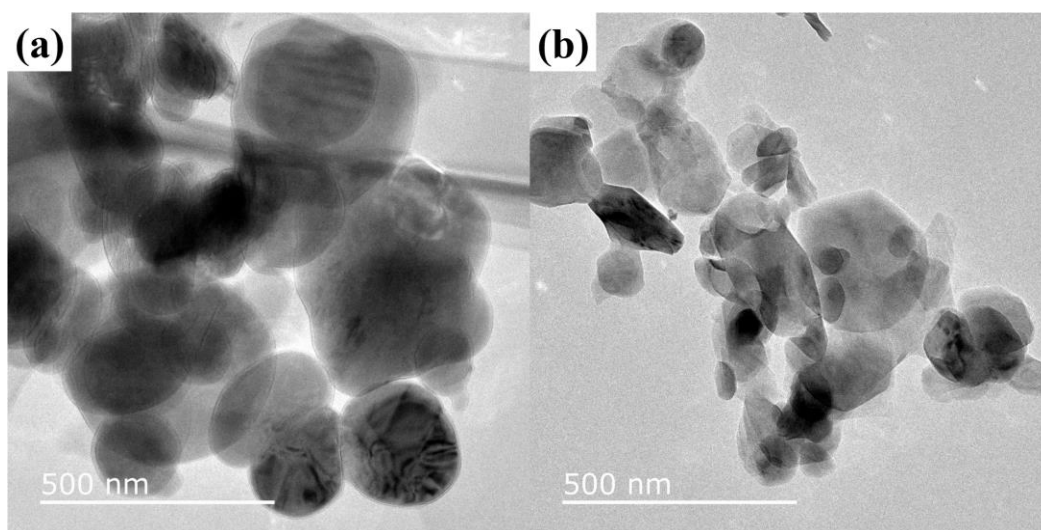


Figure S3. The TEM images of E-BN (a) and BNOH (b).

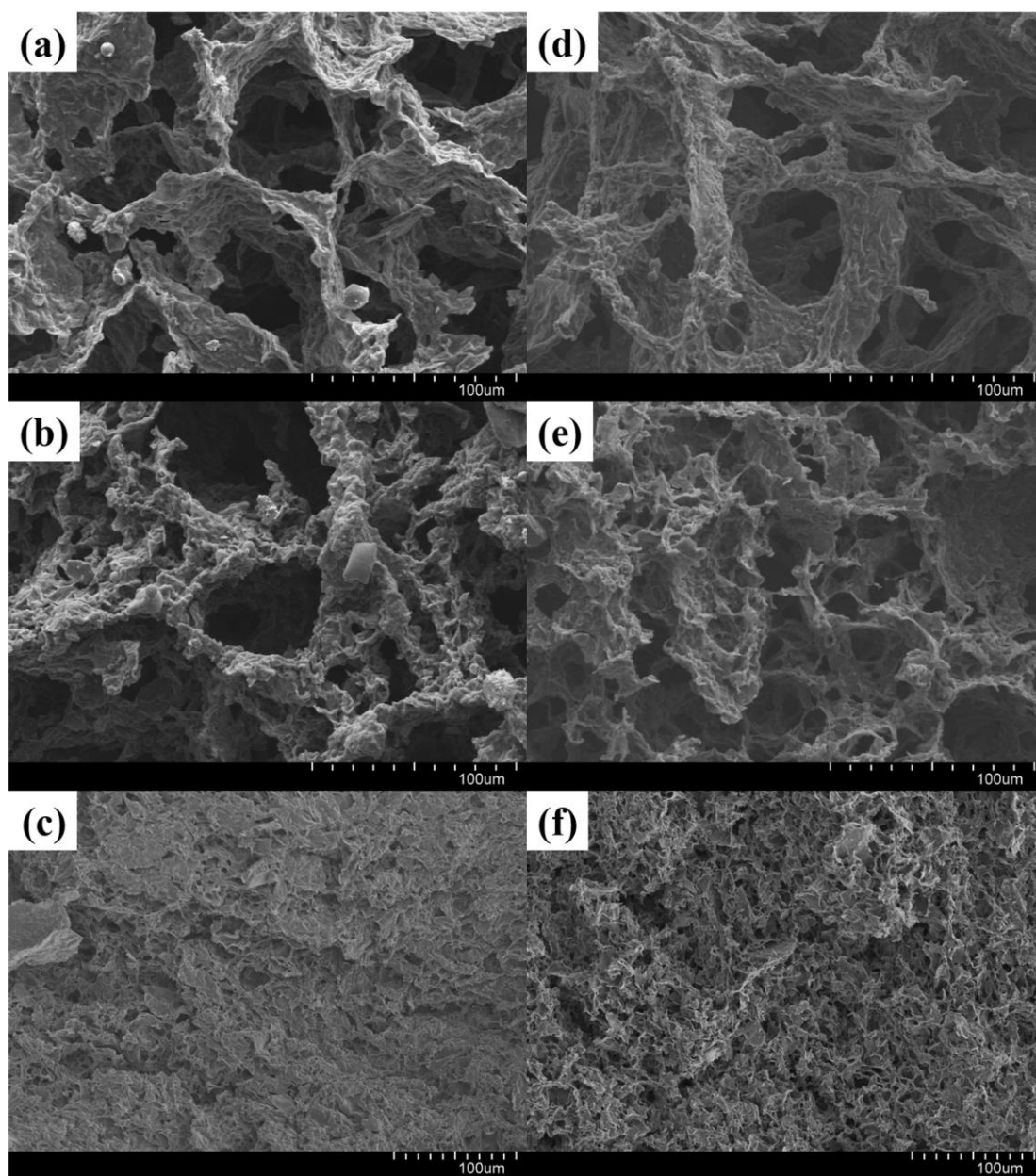


Figure S4. SEM images of EP/GNS and EP/GNS/BNOH hybrid aerogels: (a) EP/GNS-1; (b) EP/GNS-2; (c) EP/GNS-3; (d) EP/GNS/BNOH-1; (e) EP/GNS/BNOH-2; (f) EP/GNS/BNOH-3.

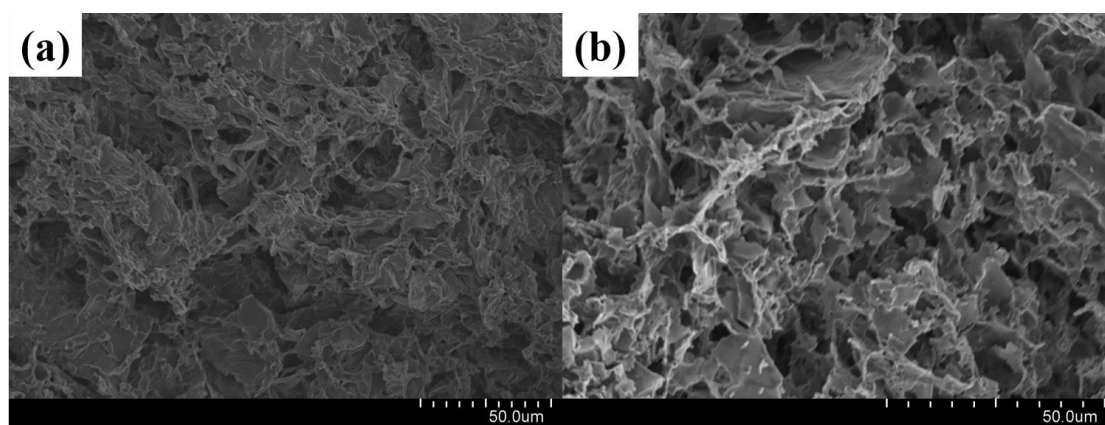


Figure S5. SEM images of EP/GNS-3 (a) and EP/GNS/BNOH-3 (b) hybrid aerogels.

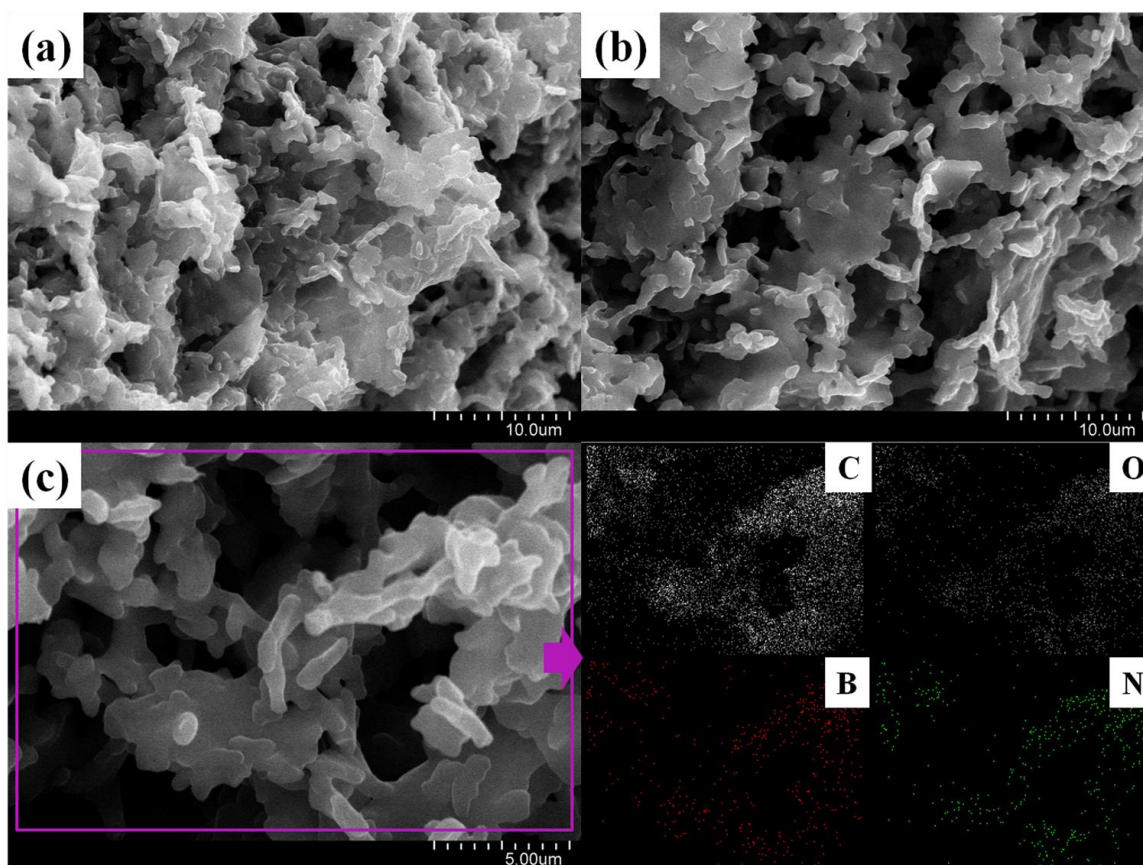


Figure S6. SEM images of EP/GNS-3 (a) and EP/GNS/BNOH-3 (b) hybrid aerogels;
(c) magnified SEM image and element mapping for EP/GNS/BNOH-3.

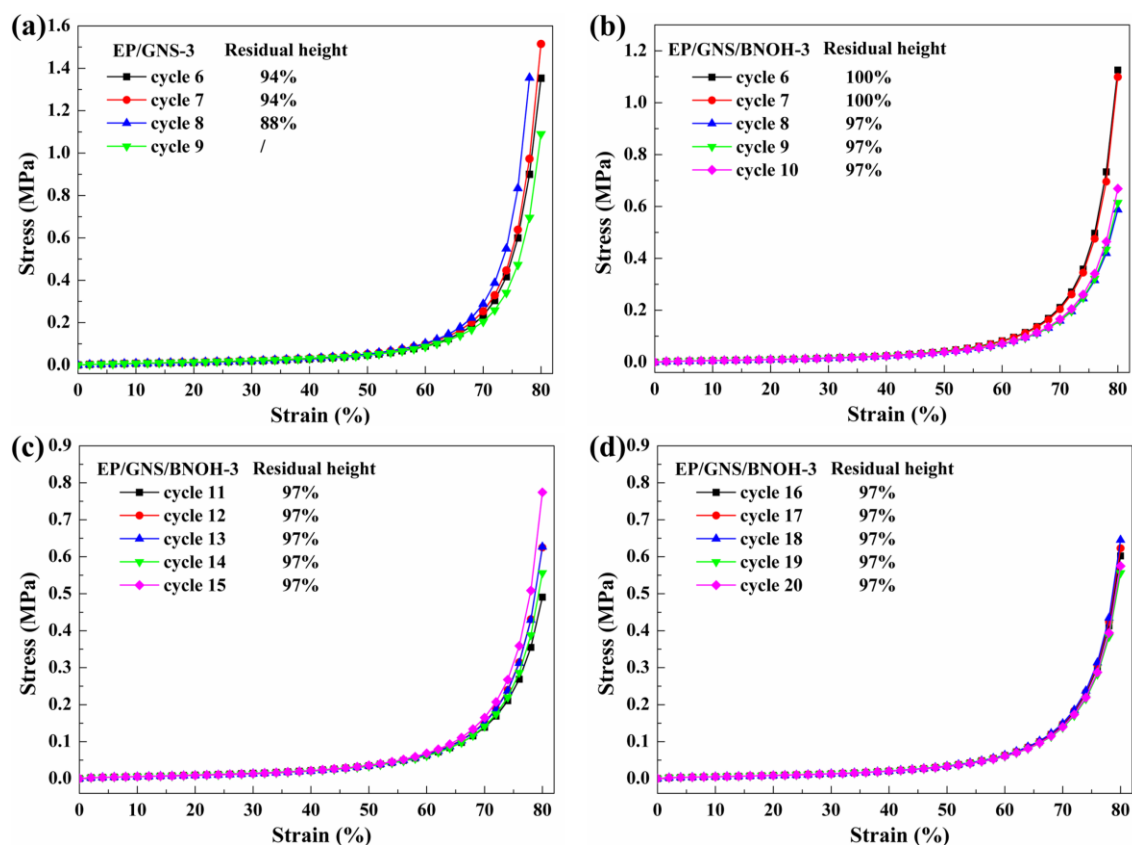


Figure S7. Stress-strain curves for repeat compression tests on EP/GNS-3 (a) and EP/GNS/BNOH-3 (b-d) at 80% strain.

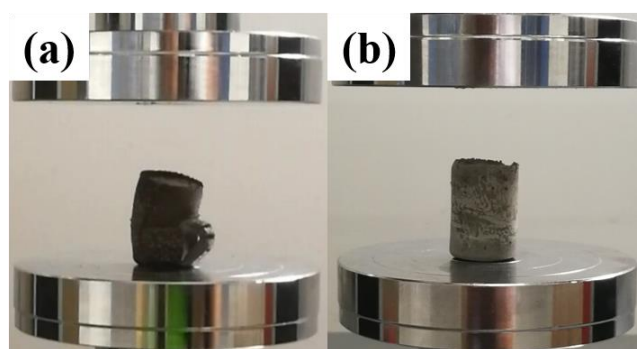


Figure S8. The digital photographs for EP/GNS-3 (a) after the 9th compression and EP/GNS/BNOH-3 (b) after the 20th compression.

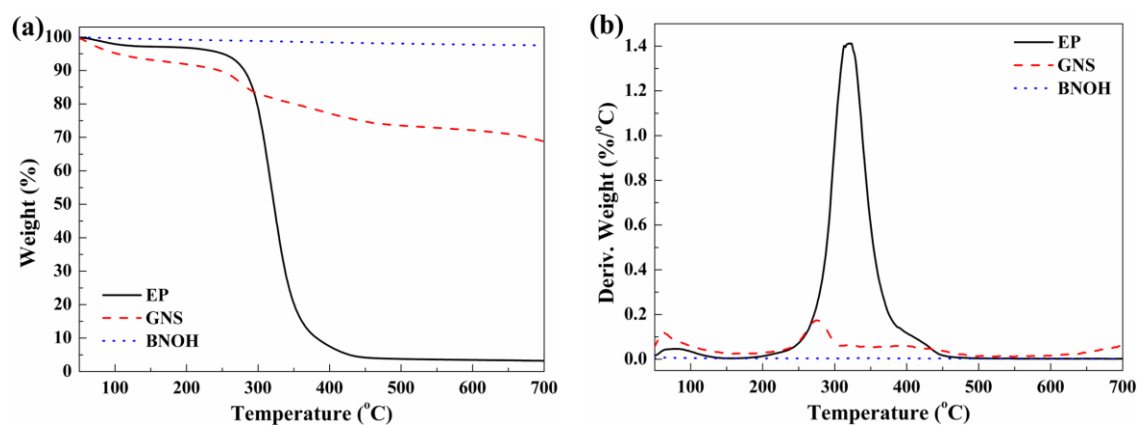


Figure S9. TG (a) and DTG (b) curves of EP, GNS and BNOH.

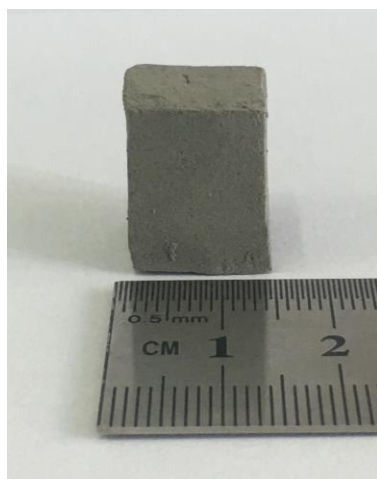


Figure S10. The diced aerogel sample for EP/GNS/BNOH-2.

REFERENCES

(S1) Song, X.; Lin, L.; Rong, M.; Wang, Y.; Xie, Z.; Chen, X. Mussel-Inspired, Ultralight, Multifunctional 3D Nitrogen-Doped Graphene Aerogel. *Carbon* **2014**, *80*, 172-182.