

Supporting Information

Fire-Resistant, Ultralight, Superelastic and Thermal-Insulated Polybenzazole Aerogels

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Table S1. The amounts of reagents used in the fabrication of PBO gels.

Solvent A ^a			Dispersion B ^b	
MSA (g)	EA (g)	H ₂ O (g)	Concentration (wt%)	Weight (g)
8.000	2.000	0.25	1.00	10.0
7.900	2.100	0.26	0.75	
7.750	2.250	0.28	0.50	
7.625	2.375	0.32	0.25	

^aMixture of MSA, EA and H₂O. ^bDispersion of PBO nanofiber in MSA and TFA.

Table S2. The densities and corresponding porosities of PBOAs.^a

Samples	PBOAs-1	PBOAs-2	PBOAs-3	PBOAs-4
ρ (mg cm ⁻³)	15.7±1.7	10.0±0.4	8.0±0.4	3.6±0.1
Porosity (%)	98.93±0.1	99.31±0.03	99.45±0.03	99.75±0.01
	1			

^aThe skeletal density of PBOAs is 1.47 g cm⁻³.

Table S3. Mechanical performance of PBOAs.

Samples	Density (mg cm ⁻³)	Young's modulus (MPa)	Stress at 90% strain (MPa)
PBOAs-1	15.7	1.22±0.12	1.10±0.10
PBOAs-2	10.0	0.40±0.06	0.24±0.01
PBOAs-3	8.0	0.19±0.03	0.15±0.02
PBOAs-4	3.6	0.03±0.01	0.03±0.01

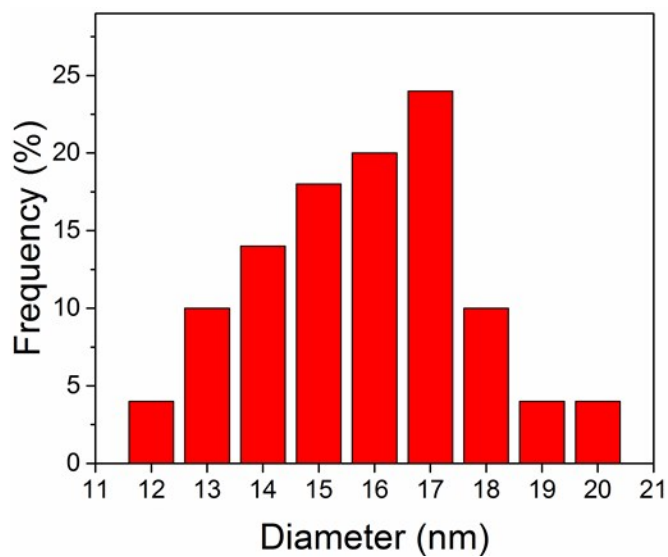


Figure S1. Statistical analysis of the diameter of PBO nanofibers according to TEM images.

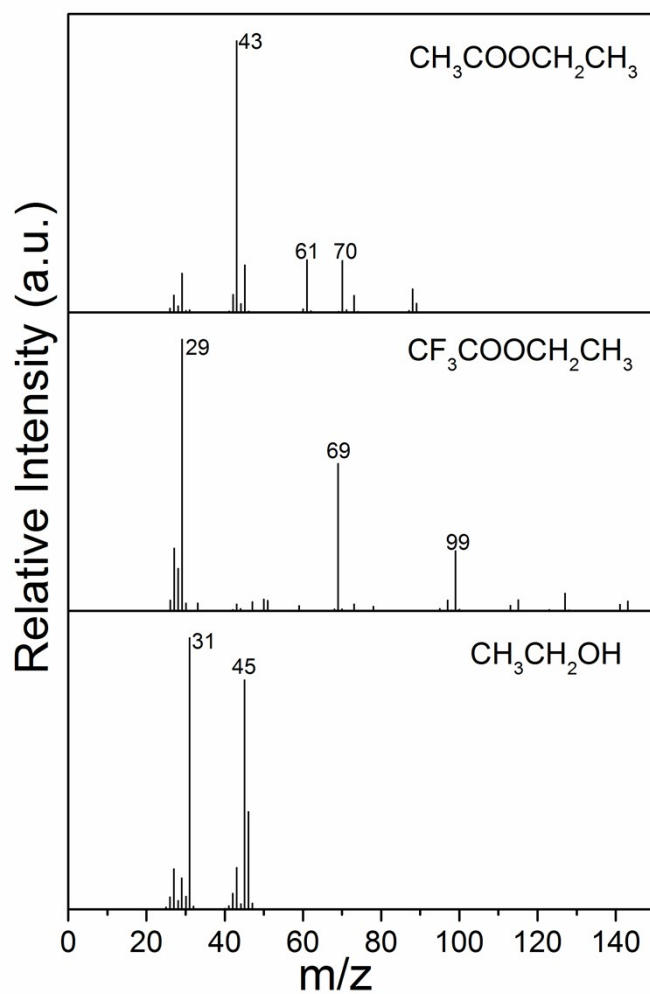


Figure S2. GC-MS spectra of the mixture of MSA, TFA, EA and H_2O reacted for 24 h, followed by washing with saturated NaHCO_3 aqueous solutions and extraction with toluene.

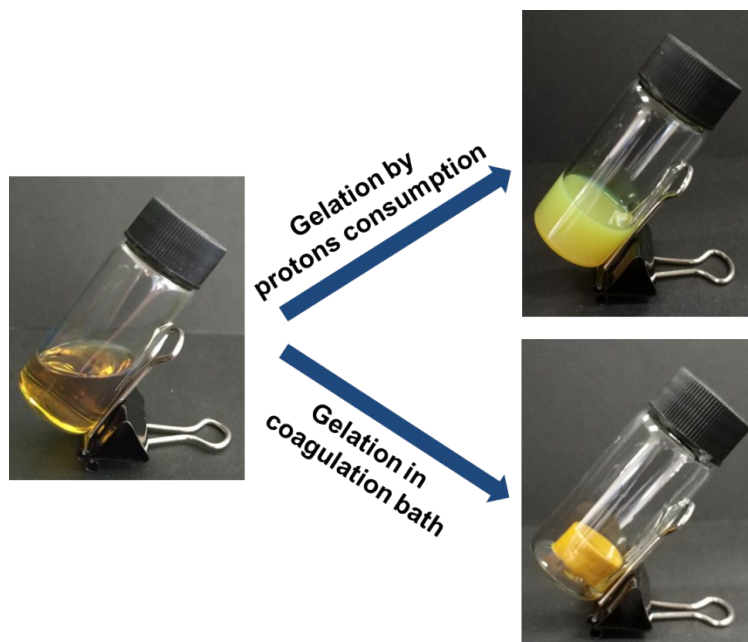


Figure S3. Photographs of the PBO nanofiber sol gelated by protons consumption or in coagulation bath.

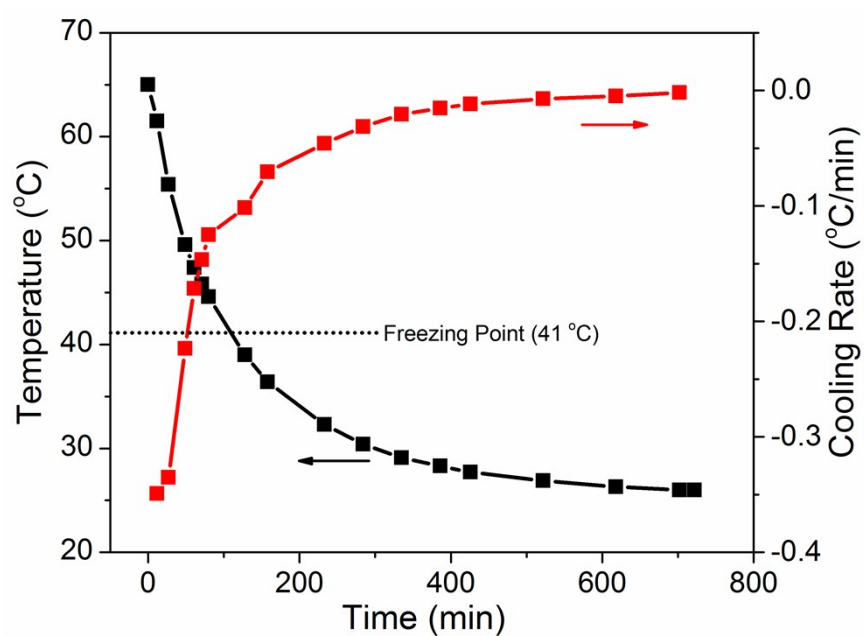


Figure S4. A controlled freezing process of PBO gels in a pre-heated oven.

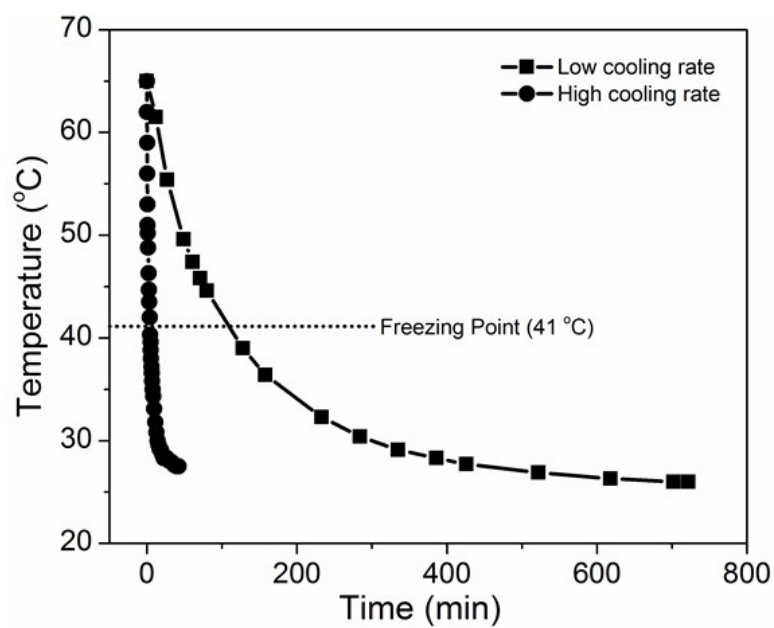


Figure S5. Varied cooling rate in the freezing process.

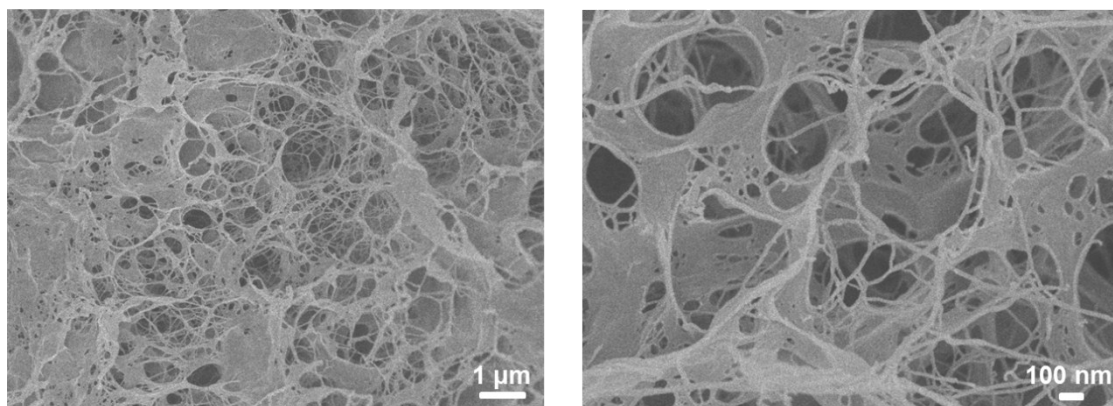


Figure S6. SEM images of PBOAs with higher cooling rate.

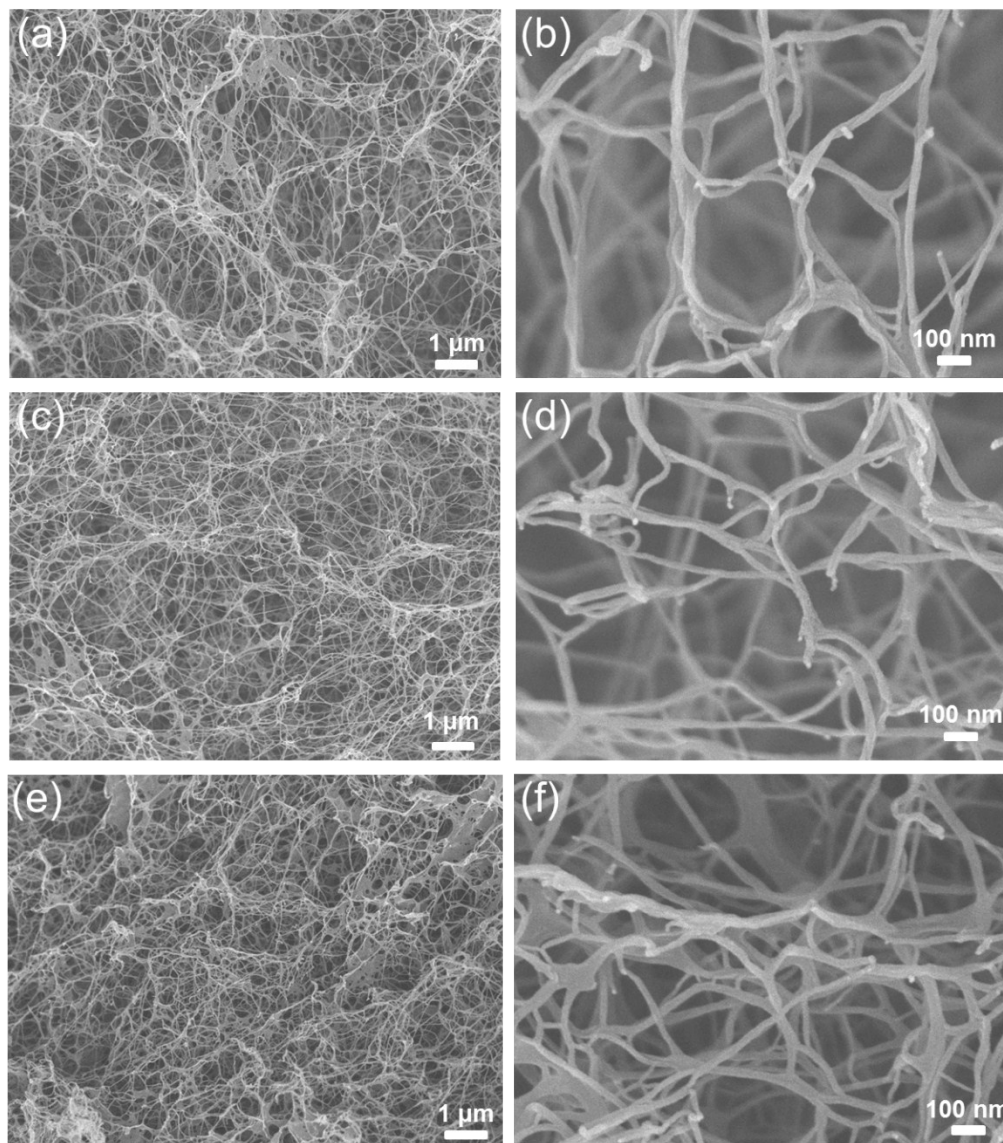


Figure S7. SEM images of (a, b) PBOAs-4, (c, d) PBOAs-2 and (e, f) PBOAs-1.

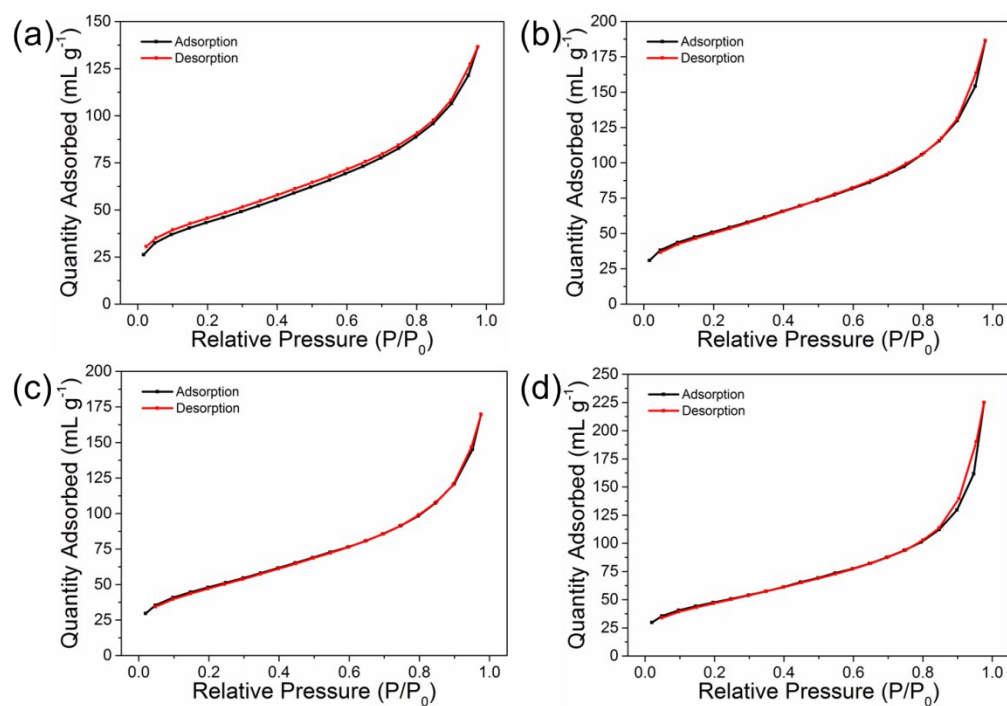


Figure S8. Nitrogen adsorption-desorption isotherms of (a) PBOAs-1, (b) PBOAs-2, (c) PBOAs-3 and (d) PBOAs-4.

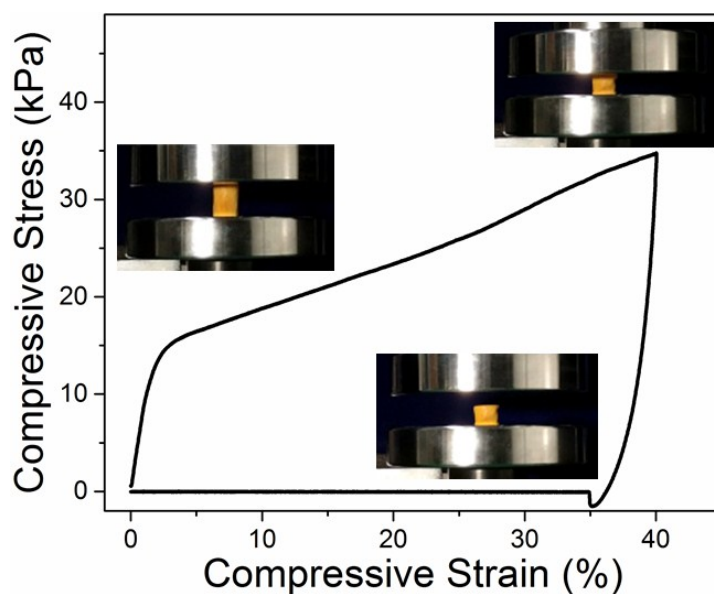


Figure S9. Compressive σ - ϵ curve of uncross-linked PBOAs. The insets are photographs showing the sample at different compressive states.

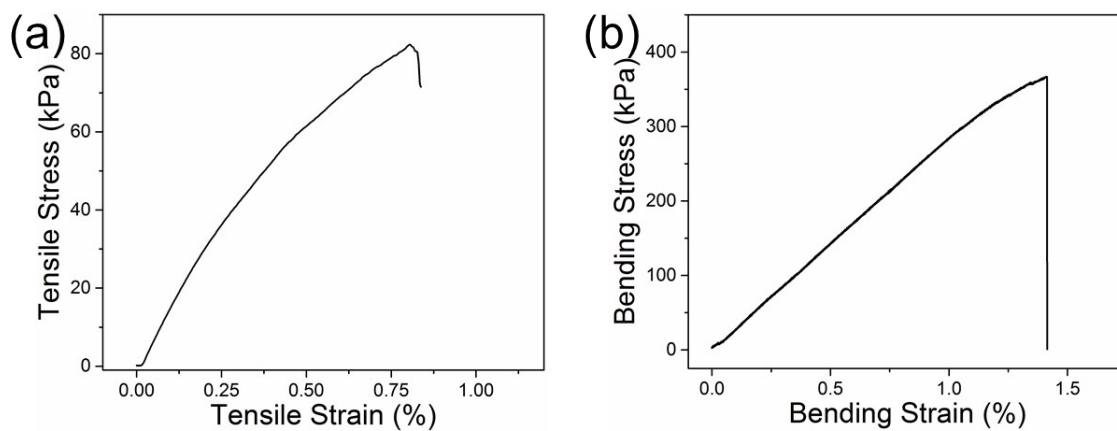


Figure S10. (a) Tensile and (b) bending stress-strain curves of PBOAs-1.

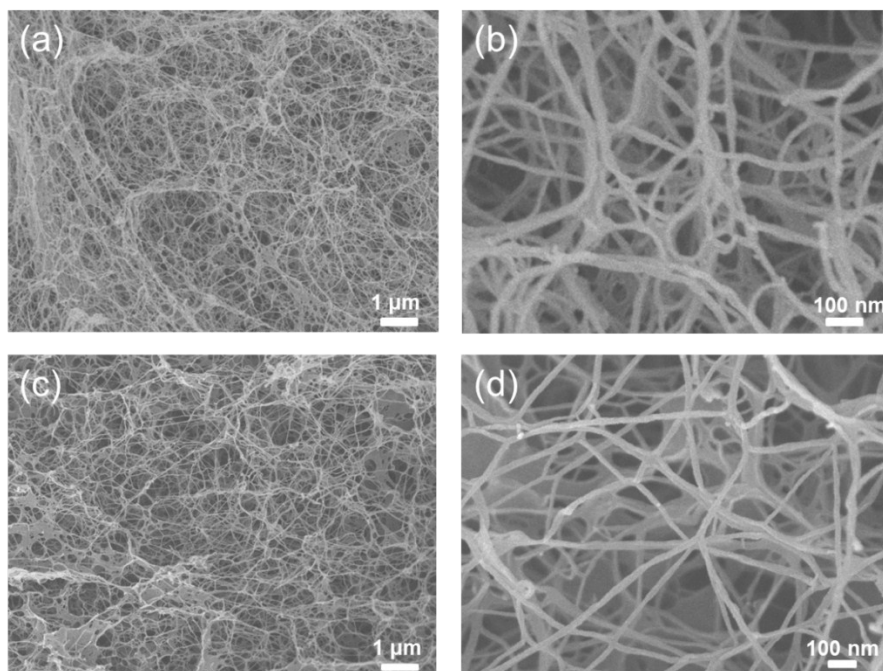


Figure S11. SEM images of PBOAs-1 (a, b) before and (c, d) after 500 loading-unloading fatigue compressive cycles at ϵ of 80%.

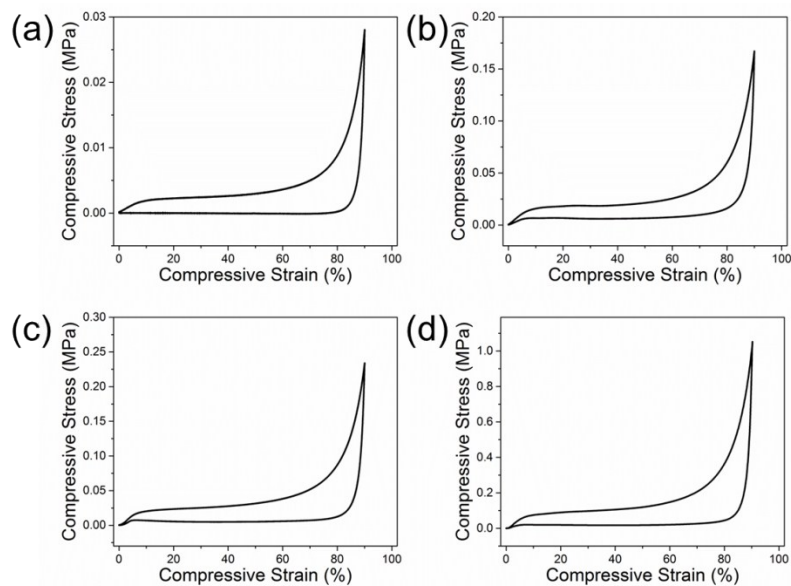


Figure S12. Compressive stress-strain curves of (a) PBOAs-4, (b) PBOAs-3, (c) PBOAs-2 and (d) PBOAs-1.

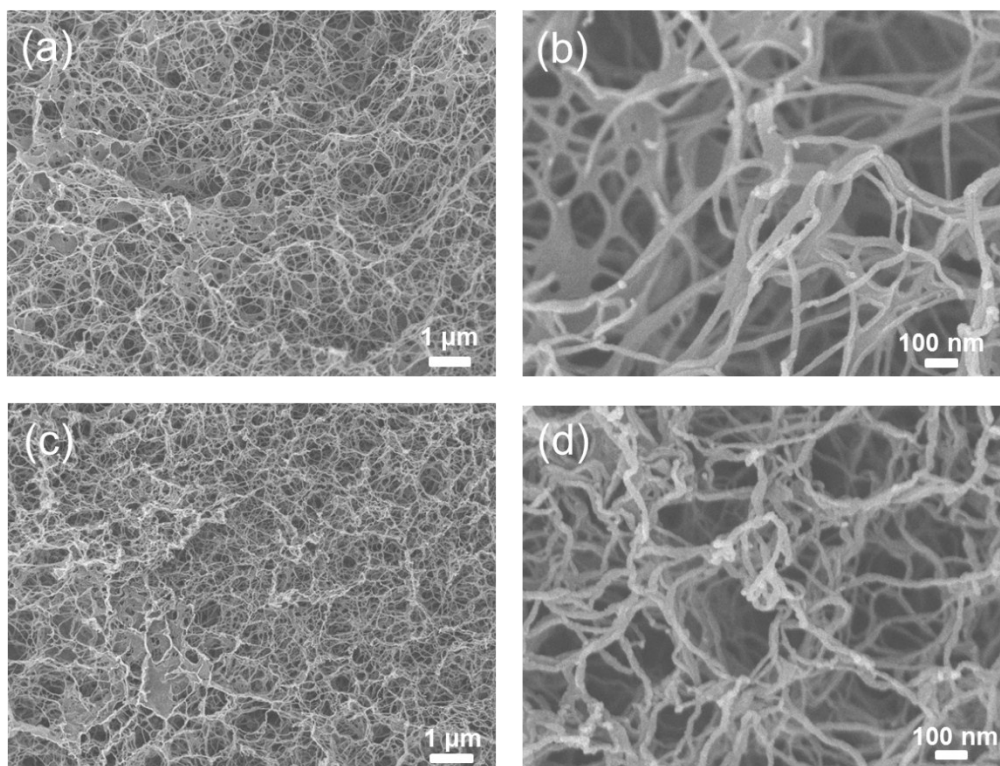


Figure S13. SEM images of PBOAs after being treated at (a, b) 300 °C and (c, d) 400 °C for 120 h.

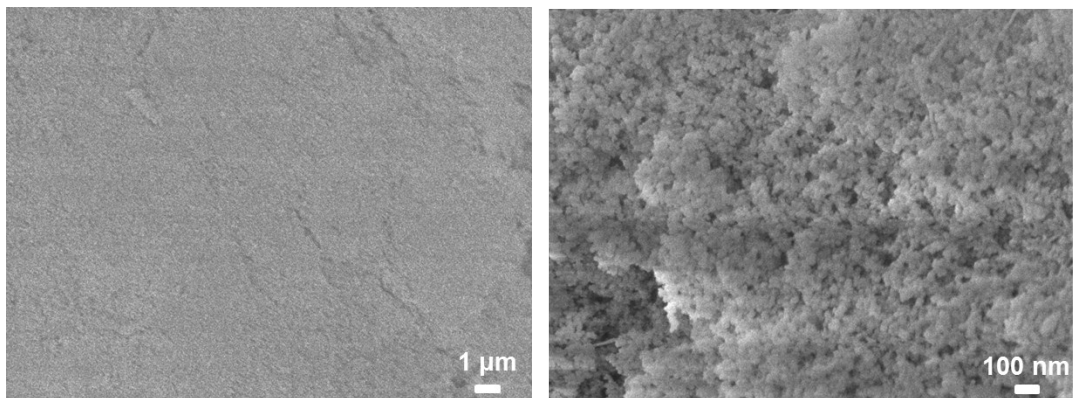


Figure S14. SEM images of PBO/FS composite aerogels.