

Scalable Ambient-Dried Aramid Aerogel Fibers with Hierarchical Networks for Ultrahigh Toughness and Thermal Insulation

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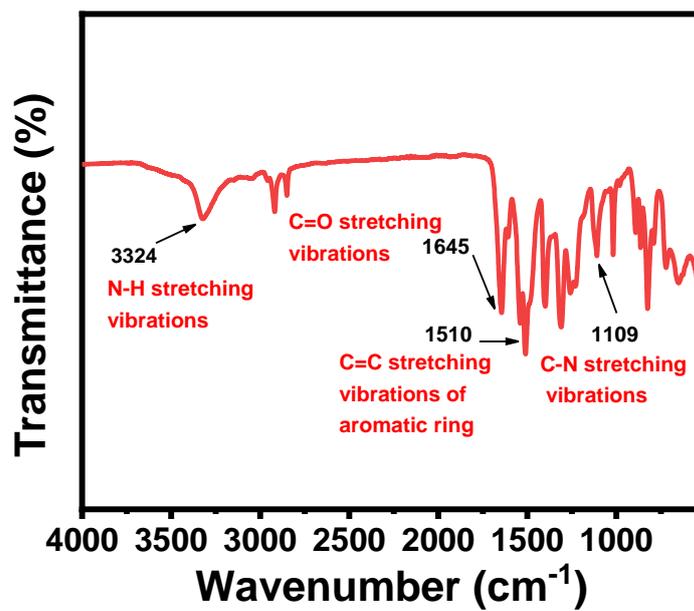


Figure S1. The FTIR spectrum of the ambient-dried ANF aerogel fiber.

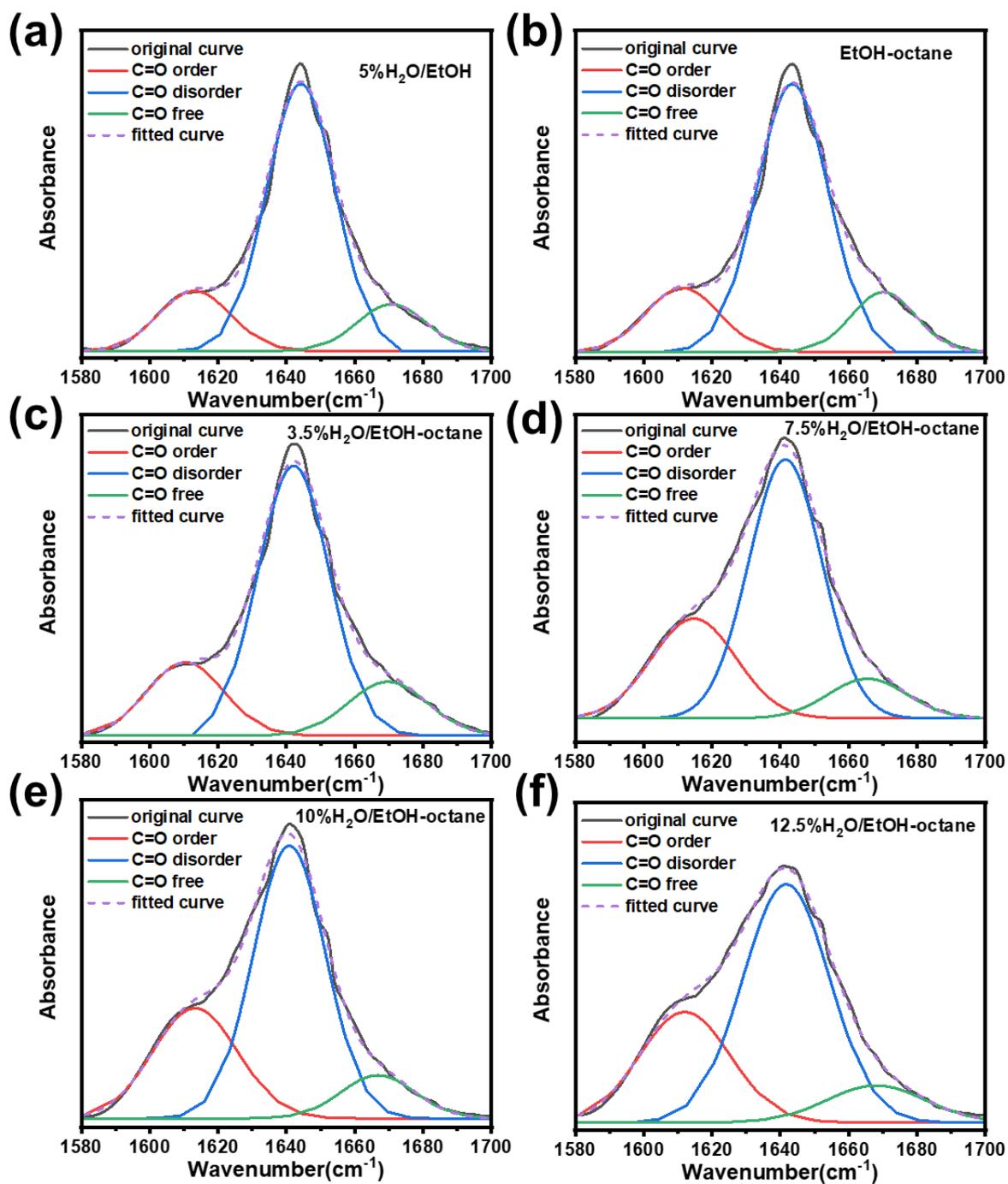


Figure S2. The split-peak fitting of C=O peaks from fibers prepared with various solvent exchange systems, (a) 5% H₂O/EtOH, (b) EtOH-octane, (c) 3.5% H₂O/EtOH-octane, (d) 7.5% H₂O/EtOH-octane, (e) 10% H₂O/EtOH-octane, (f) 12.5% H₂O/EtOH-octane.

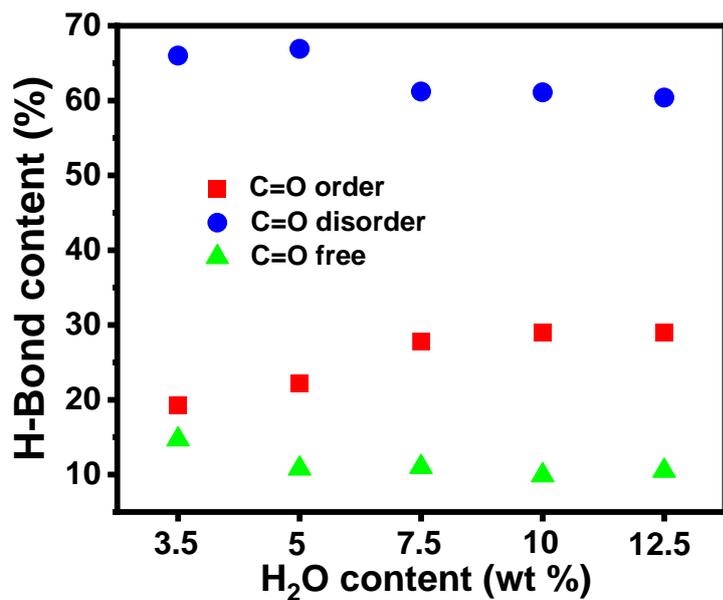


Figure S3. The content of three hydrogen-bond types derived from C=O peak fitting for fibers prepared by different proton-donor contents.

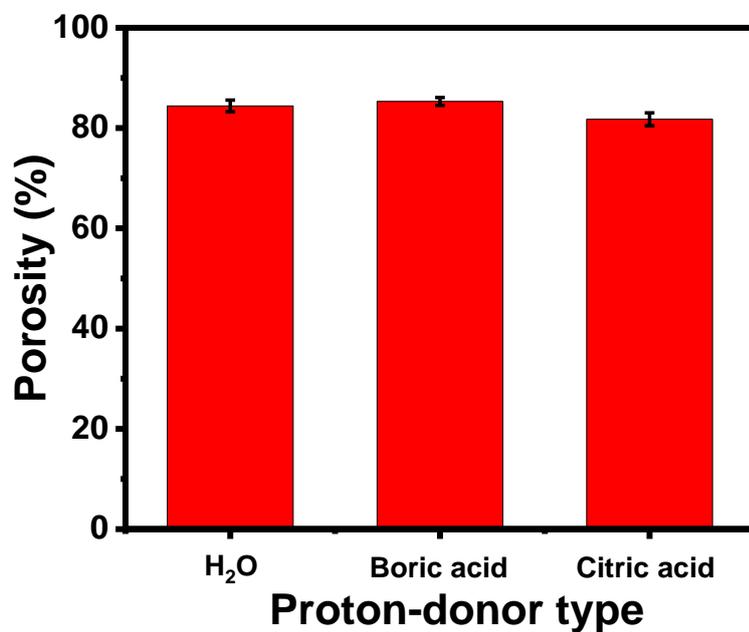


Figure S4. The porosities of ambient-dried aerogel fibers with various proton-donor types.

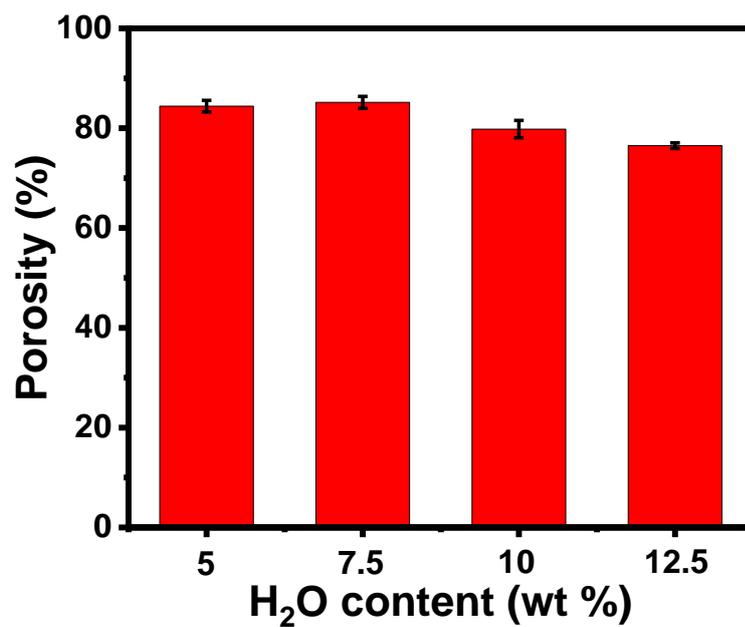


Figure S5. The porosities of ambient-dried aerogel fibers with various proton-donor contents.

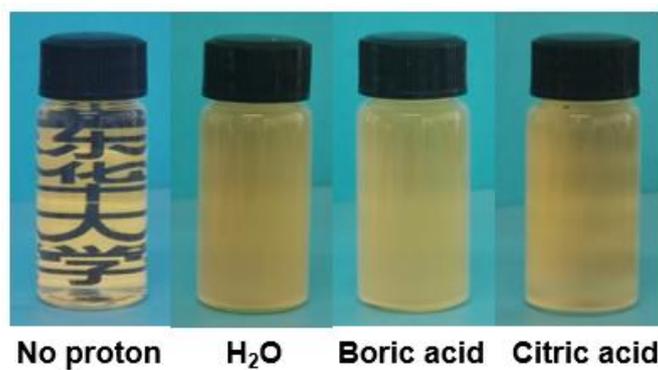


Figure S6. The phase separation behavior of ethanol and n-octane in systems with varying proton-donor types.

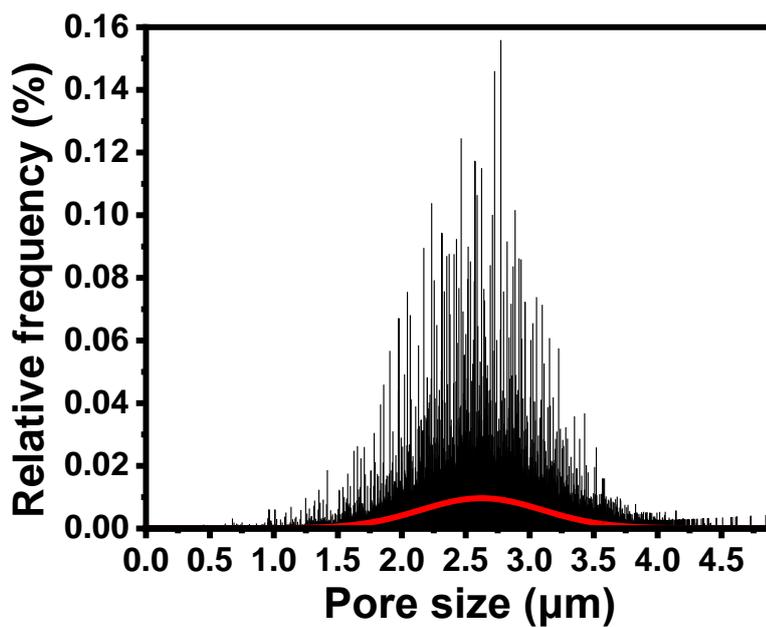


Figure S7. The size distribution of the micro-scale pores evaluated by Nano-CT.

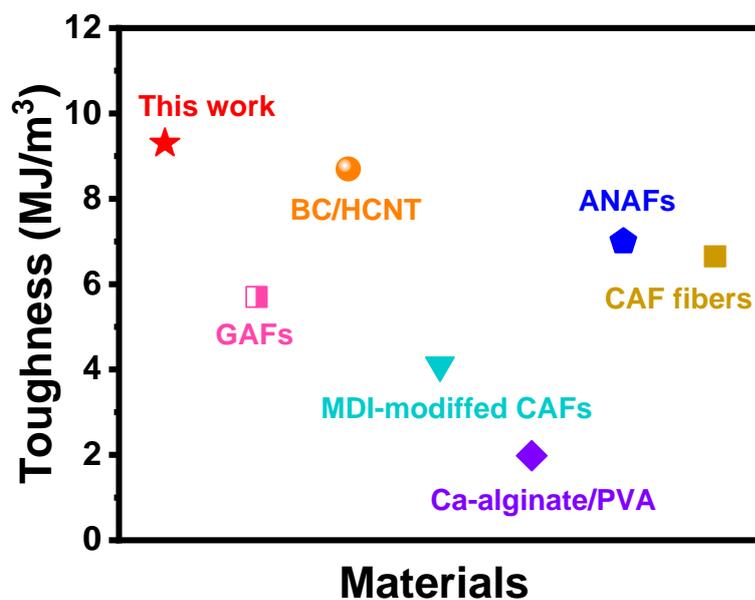


Figure S8. Comparison of the toughness of the as-prepared aerogel fibers with recently reported aerogel fibers.¹⁻⁶

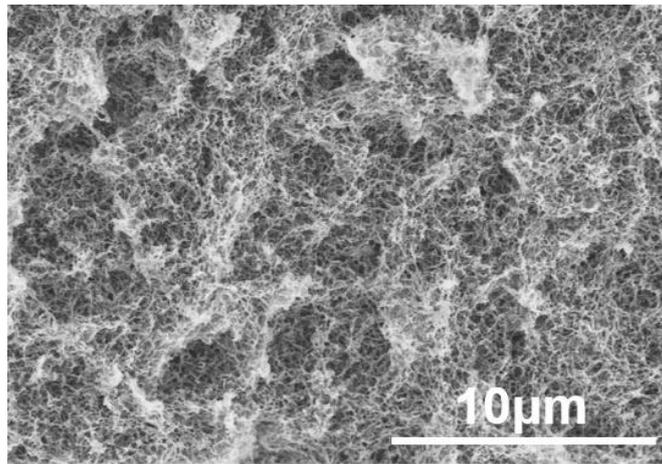


Figure S9. The cross-sectional SEM micrograph of the aerogel fibers after cryogenic treatment and mechanical cycling.

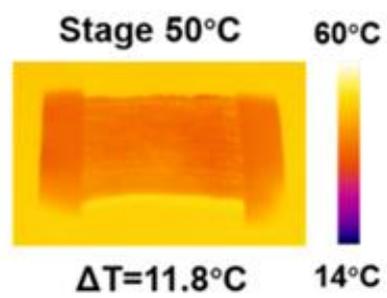


Figure S10. Infrared images of the aerogel textile on a hot stage at 50°C.

Table S1. Comparison of tensile stress, fracture strain, porosity and fiber diameter of the as-prepared aerogel fibers with recently reported counterparts.

Materials	Tensile strength (MPa)	Fracture strain (%)	Porosity (%)	Fiber diameter (μm)	Ref.
This work	13.2	84.4	83.3	198	/
This work	14.6	88.8	85.2	212	/
This work	21.2	78.4	81.5	182	/
Crosslinked polyimide aerogel fibers	22	22	/	300	7
AgNWs-MXene@ANFs aerogel fibers	26.7	27	/	/	8
Polyimide aerogel fibers	10.6	28.9	88	300	9
ANF/CNT/PPy aerogel fibers	2.88	21	/	625	10
Twisted aerogel yarns	16.3	55.4	78	800	11
Composite nanofiber aerogel	6.3	22.4	76	1500	12
CNF xerogels	8	9	80	2000	13
Gradient nanostructured aerogel fibers	29.5	39.2	98.6	/	4

Supplementary References

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