Supporting Information

Shaping topological structures and intrinsic properties of aramid nanofiber films through fluid flow templating

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Supplementary Figures

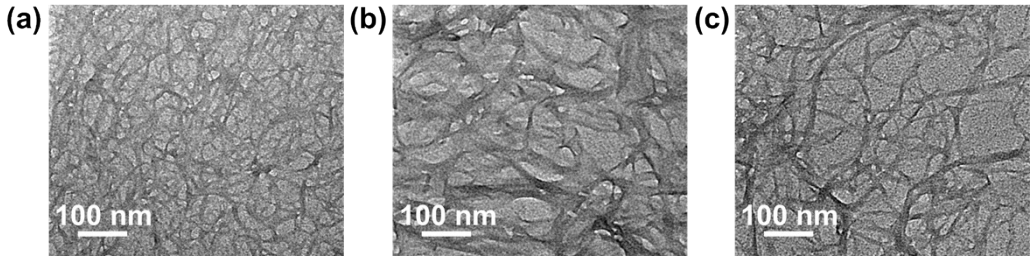

Fig. S1. TEM images of the microscopic rigid rod-like chain of (a) ANF-1000, (b) ANF-5000, and (c) ANF-20000 structural units.

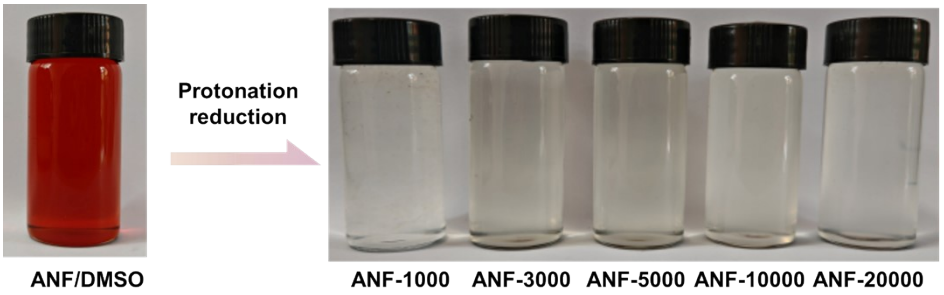

Fig. S2. Optical photographs showing the color change of ANF in deionized water before and after reprotonation.

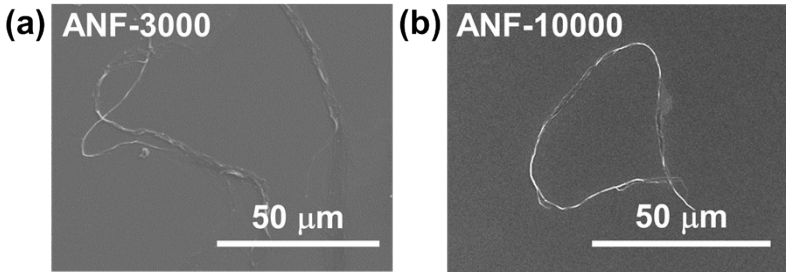

Fig. S3. SEM images showing the micrographs of the ANF-3000 and ANF-10000 structural units.

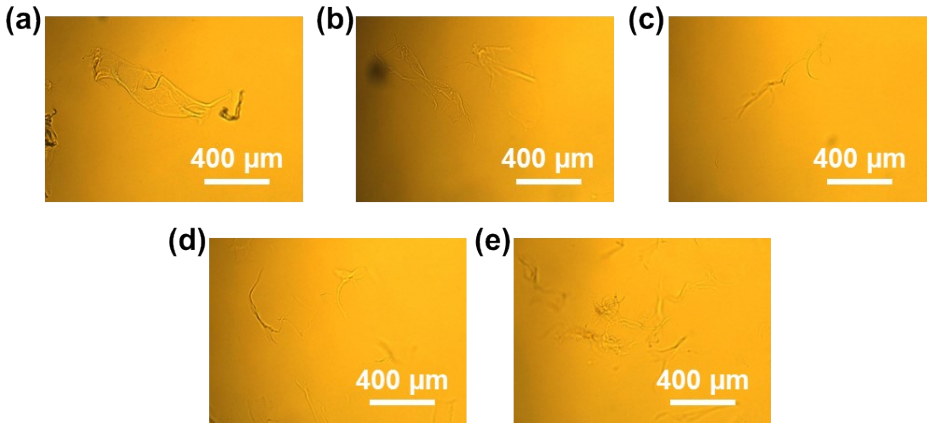

Fig. S4. POM images of the nano self-assembly structure of (a) ANF-1000, (b) ANF-3000, (c) ANF-5000, (d) ANF-10000, and (e) ANF-20000.

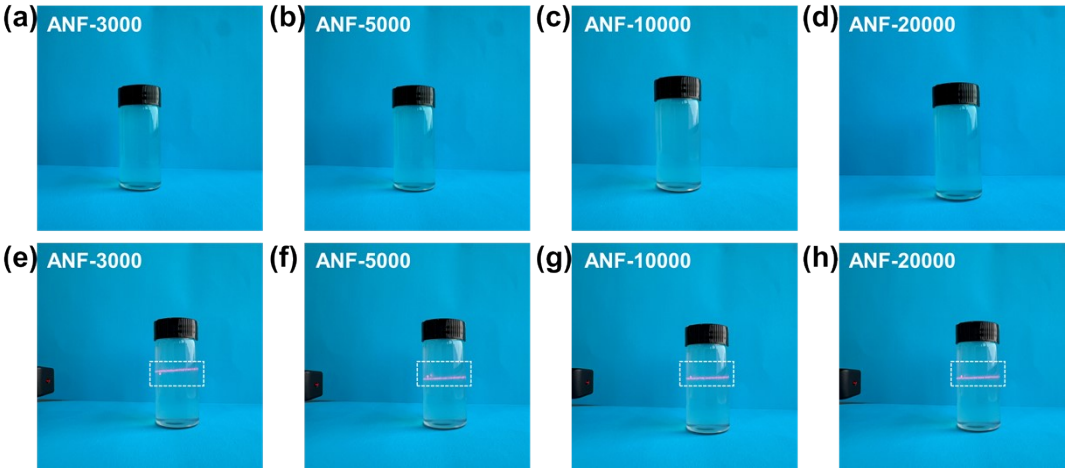

Fig. S5. Optical photographs presenting (a-d) stable colloids and (e-h) Tyndall effect of ANF-3000, ANF-5000, ANF-10000, and ANF-20000.

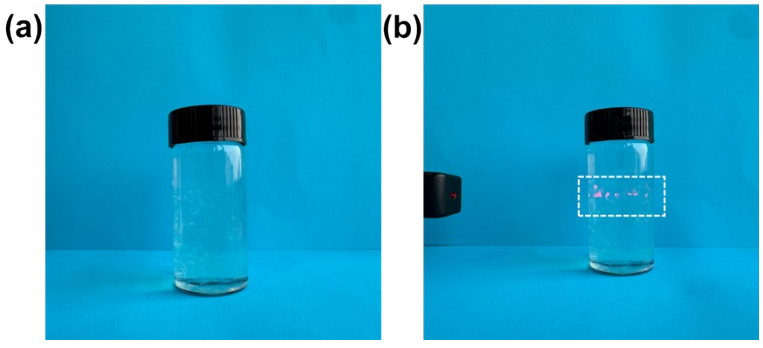

Fig. S6. Optical photographs showing (a) nonuniformly dispersed ANF-1000 and (b) ANF-1000 irradiated by a laser.

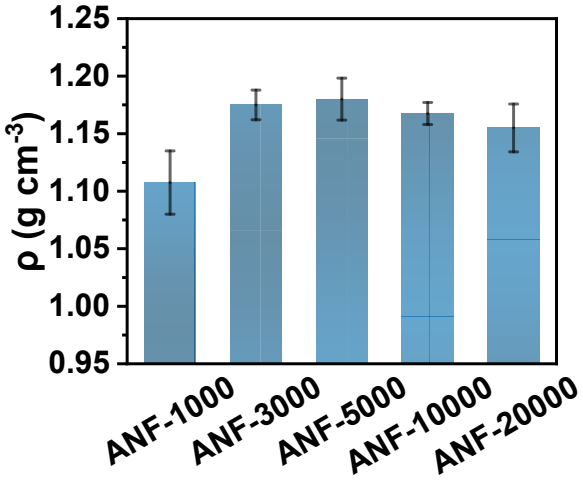

Fig. S7. Density of the ANF films.

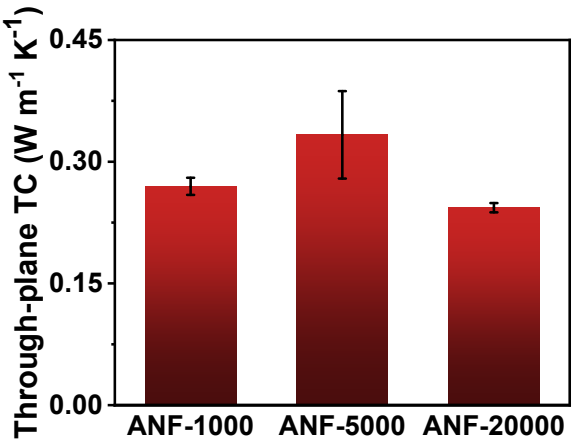

Fig. S8. Through-plane thermal conductivity of ANF-1000, ANF-5000 and ANF-20000.

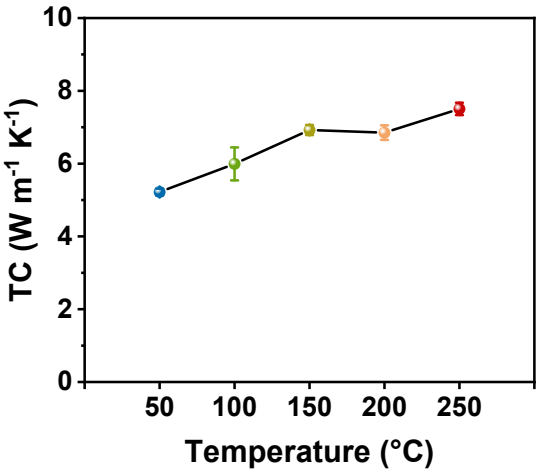

Fig. S9. In-plane thermal conductivity of the ANF-5000 film as a function of temperature.

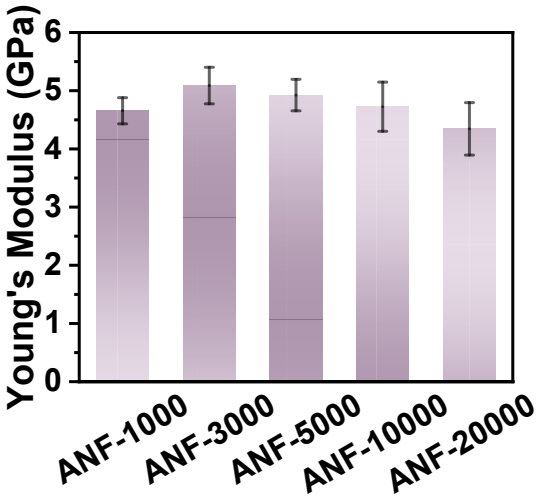

Fig. S10. Young's modulus of the ANF films.

Fig. S11. Optical image showing ANF-5000 supporting a load of 1 kg.

Supplementary Tables

Table S1 Standard deviation of the surface elastic modulus of the ANF films.

	ANF-1000	ANF-3000	ANF-5000	ANF-10000	ANF-20000
Standard deviation (GPa)	0.3	2.4	2.5	2.5	3.1

Table S2 Decomposition temperatures of the ANF films.

	ANF-1000	ANF-3000	ANF-5000	ANF-10000	ANF-20000
T_0 (°C)	450.7	453.8	451.3	457.8	448.3
T_{max} (°C)	539.8	547.0	542.5	545.3	545.2

Table S3 Comparison of thermal conductivity and mechanical properties between pure ANF films reported in literatures and developed in this work.

Reference	Thermal conductivity (W m^{-1} K^{-1})	Tensile strength (MPa)	Elongation at break (%)
2025[S1]	5.16	\	\
2025[S2]	4.79	\	\
2025[S3]	5.05	181.4	9.1
2025[S4]	1.512	~220	~7
2024[S5]	1.07	143.6	~11.5
2023[S6]	~2.4	154	4
2023[S7]	2.27	~225	~13
2022[S8]	2.45	~175	~8
2022[S9]	1.33	137.6	~12
2020[S10]	\	180	~5.5
2024[S11]	~4.5	137	11.9
2024[S12]	1.8	56.1	4.15
2021[S13]	~1.55	~175	~5.3
2023[S14]	2.25	74	4.6
This work	**5.49**	**208.8**	**15.9**

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