

Supporting Information

Effects of Electrospun Janus Structure on An Enhanced UV Resistance

Performance

Bingying Chen, Junli Guo, Chen Chen, Yueling Shen, Yaoyao Yang*, and DengGuang Yu*

School of Materials and Chemistry, University of Shanghai for Science and Technology, 516 Jungong Road, Shanghai 200093, China.†

* Yaoyao Yang: yuyang@usst.edu.cn

* Dengguang Yu: ydg017@usst.edu.cn

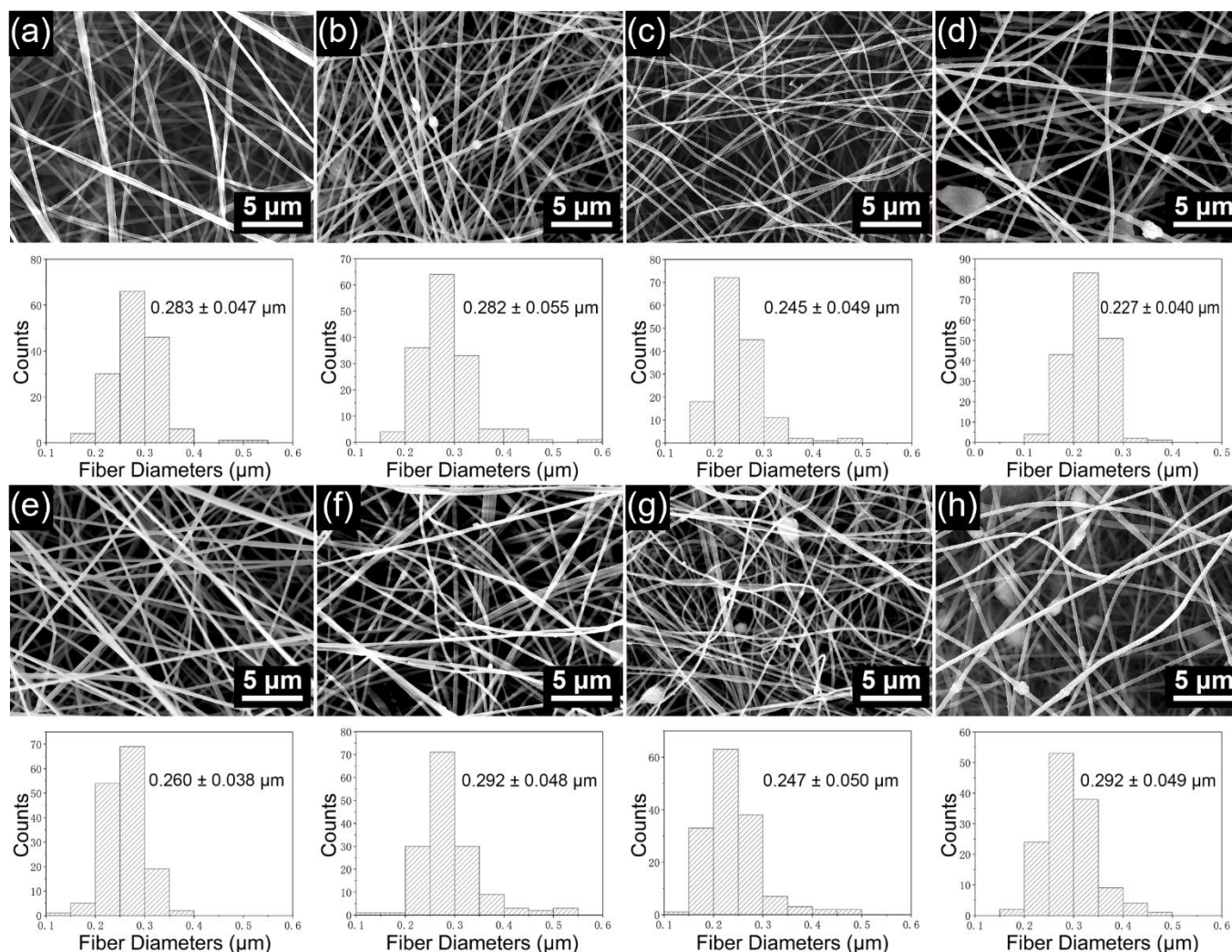


Fig. S1. SEM images and diameter distributions of membranes with 0, 1, 5, 10 wt% content of TiO₂:

(a, b, c, d) Px membrane; (e, f, g, h) Px-6h membrane.

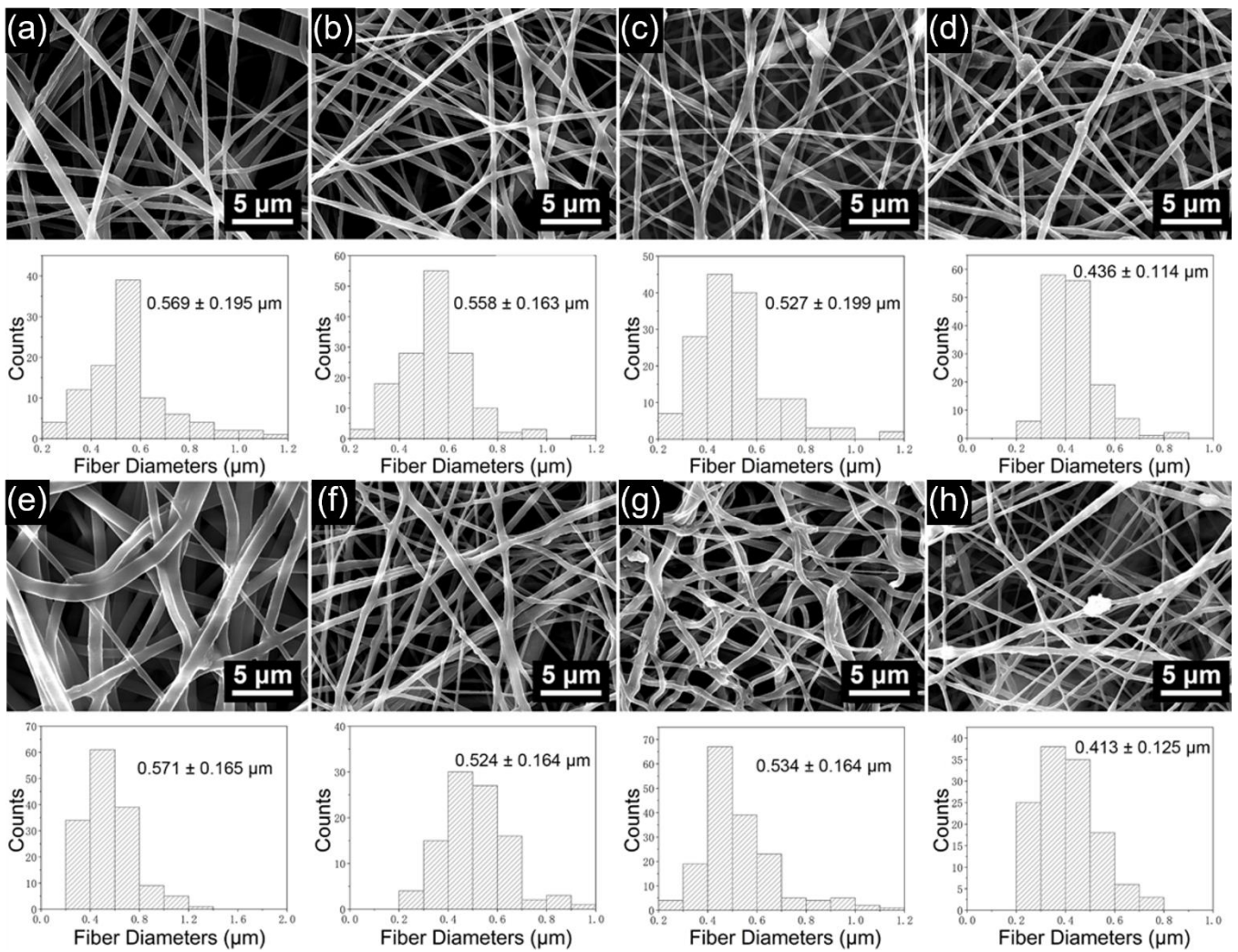


Fig. S2. SEM images and diameter distributions of membranes with 0,1,5,10 wt% content of TiO_2 :

(a,b,c,d) Tm membrane; (e,f,g,h) Tm-6h membrane.

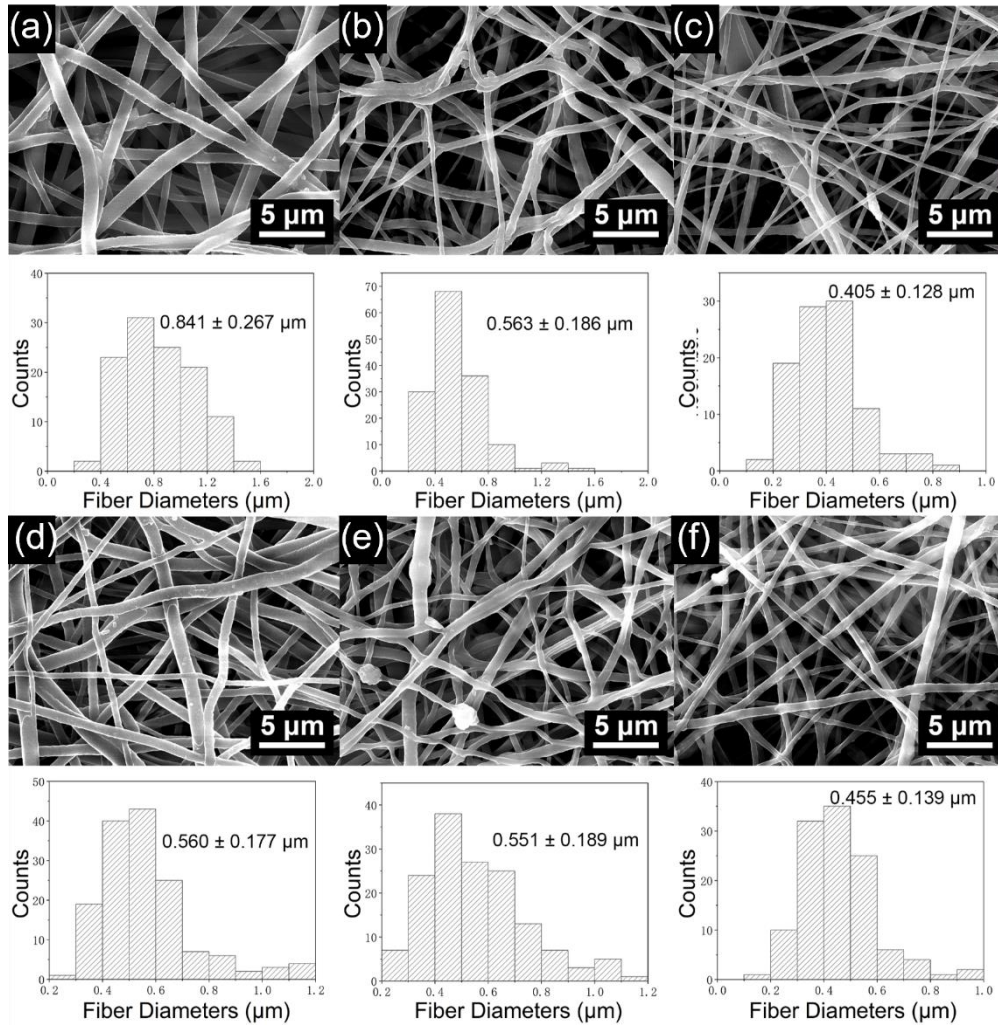


Fig. S3. SEM images and diameter distributions of membranes with 1,5,10 wt% content of TiO_2 :

(a,b,c) Tn//TPU membrane; (d,e,f) Tn//TPU-6h membrane.

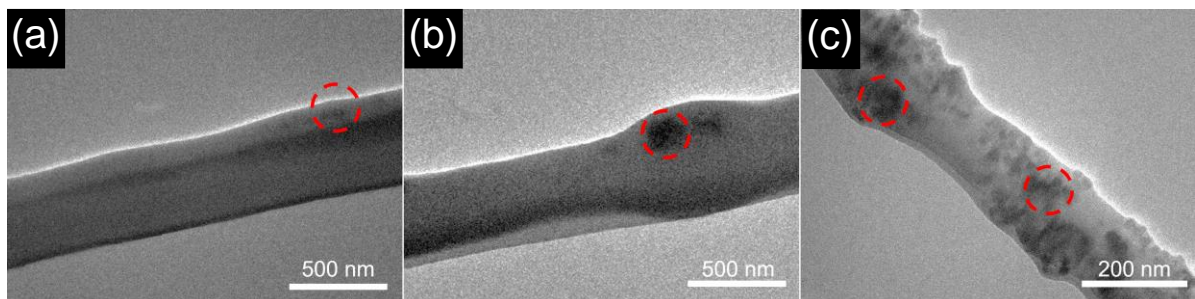


Fig. S4. (a, b, c) TEM images of Tn//TPU with 1,5,10 wt% content of TiO_2 . The scale bar is 500 nm.

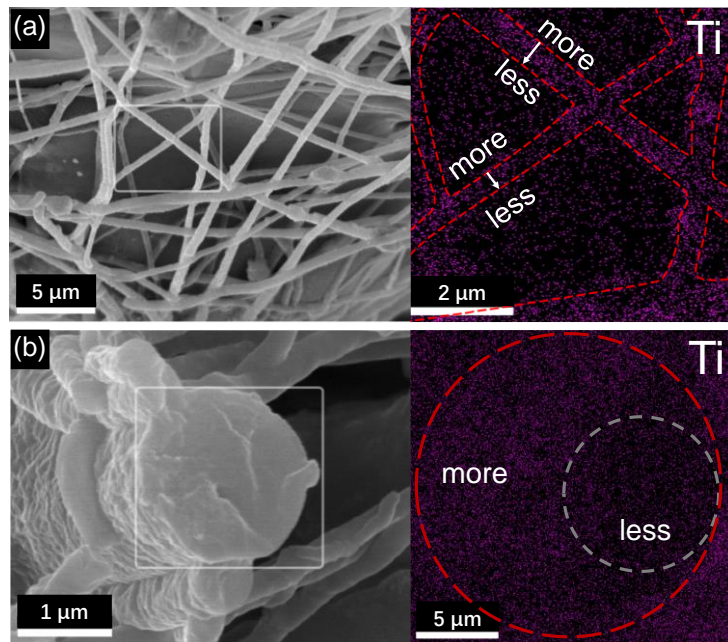


Fig. S5. EDS spectra of P1//TPU nanofibers: (a) surface and (b) cross-section.

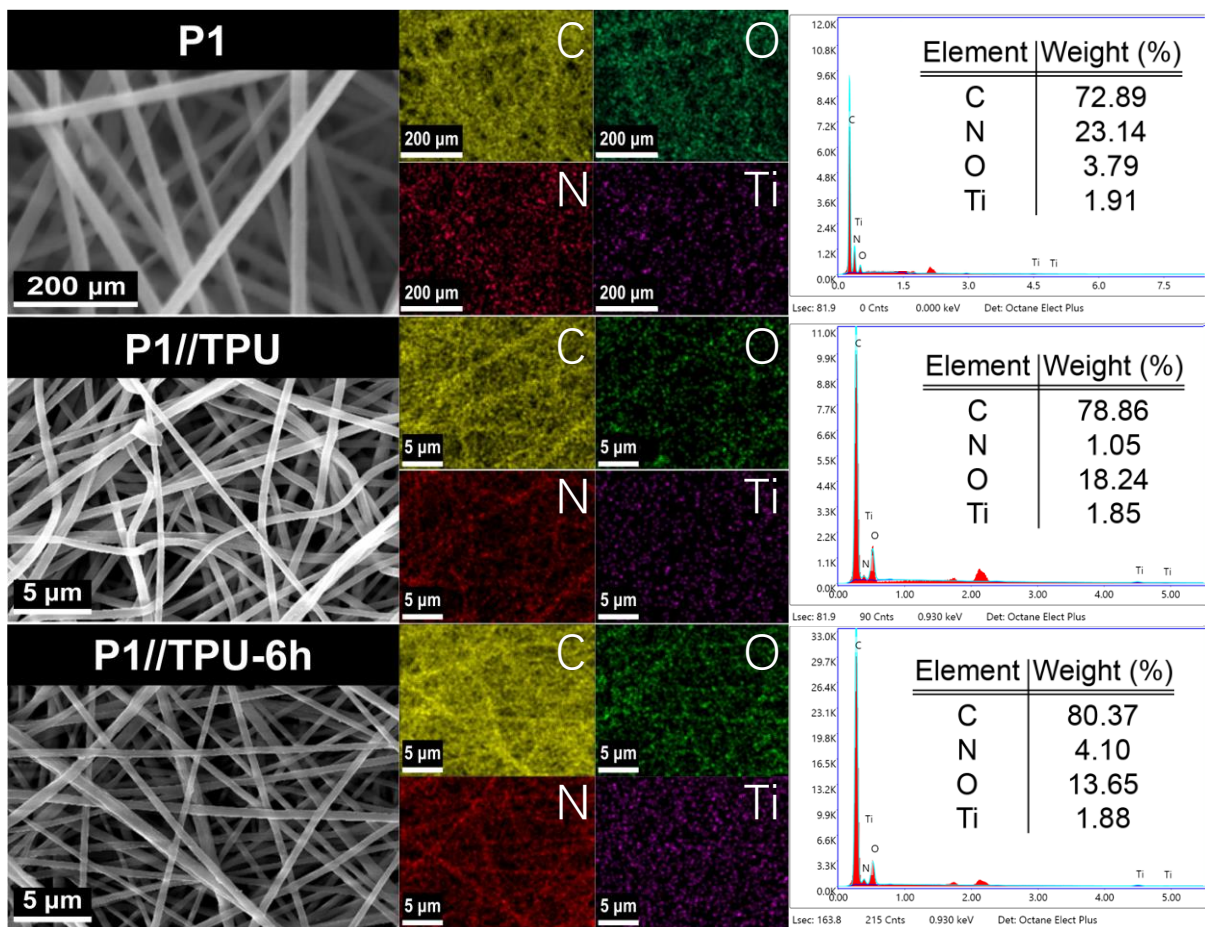


Fig. S6. EDS spectra of different fiber membranes.

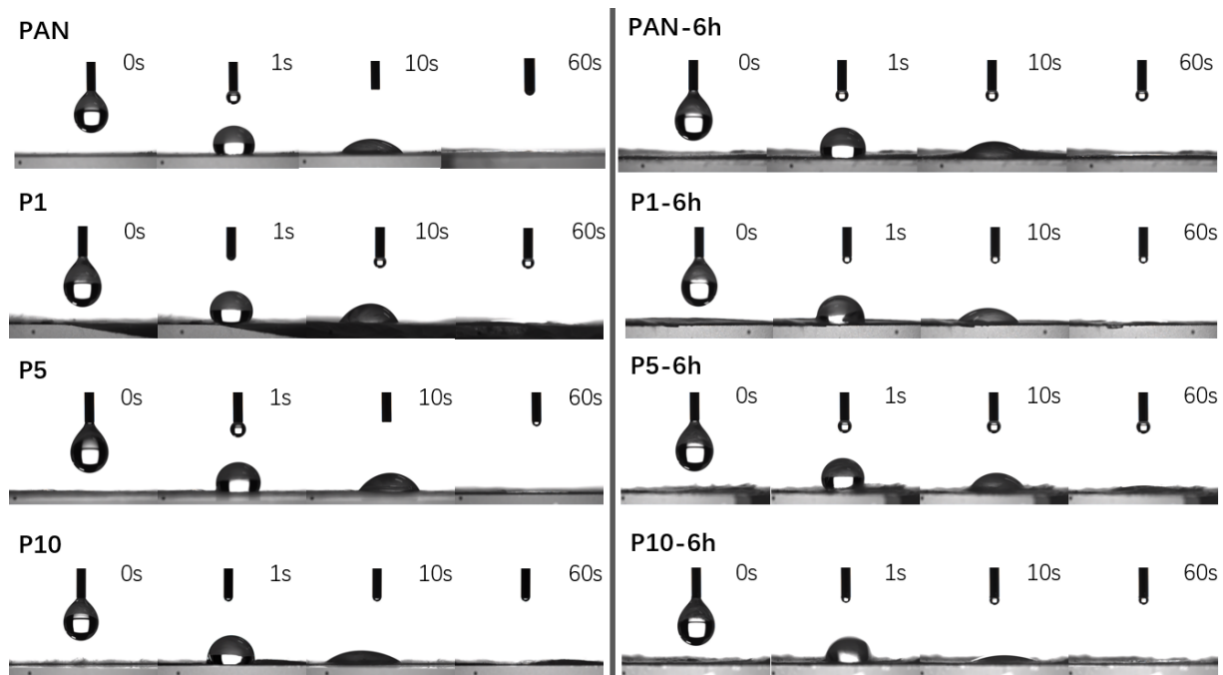


Fig. S7. The process of water contact angle change over 60 s for Px and Px-6h fiber membranes.

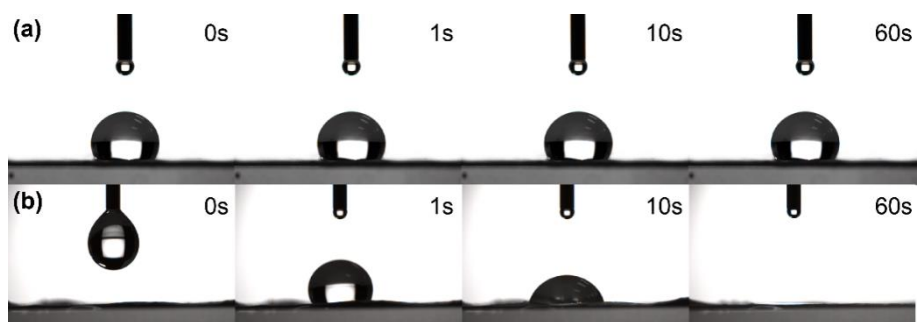


Fig. S8. Water contact angle change process:(a) TPU membrane; (b) TPU-6h membrane.



Fig. S9. Water vapor transmission: aluminum foil (left) and cling film (right).

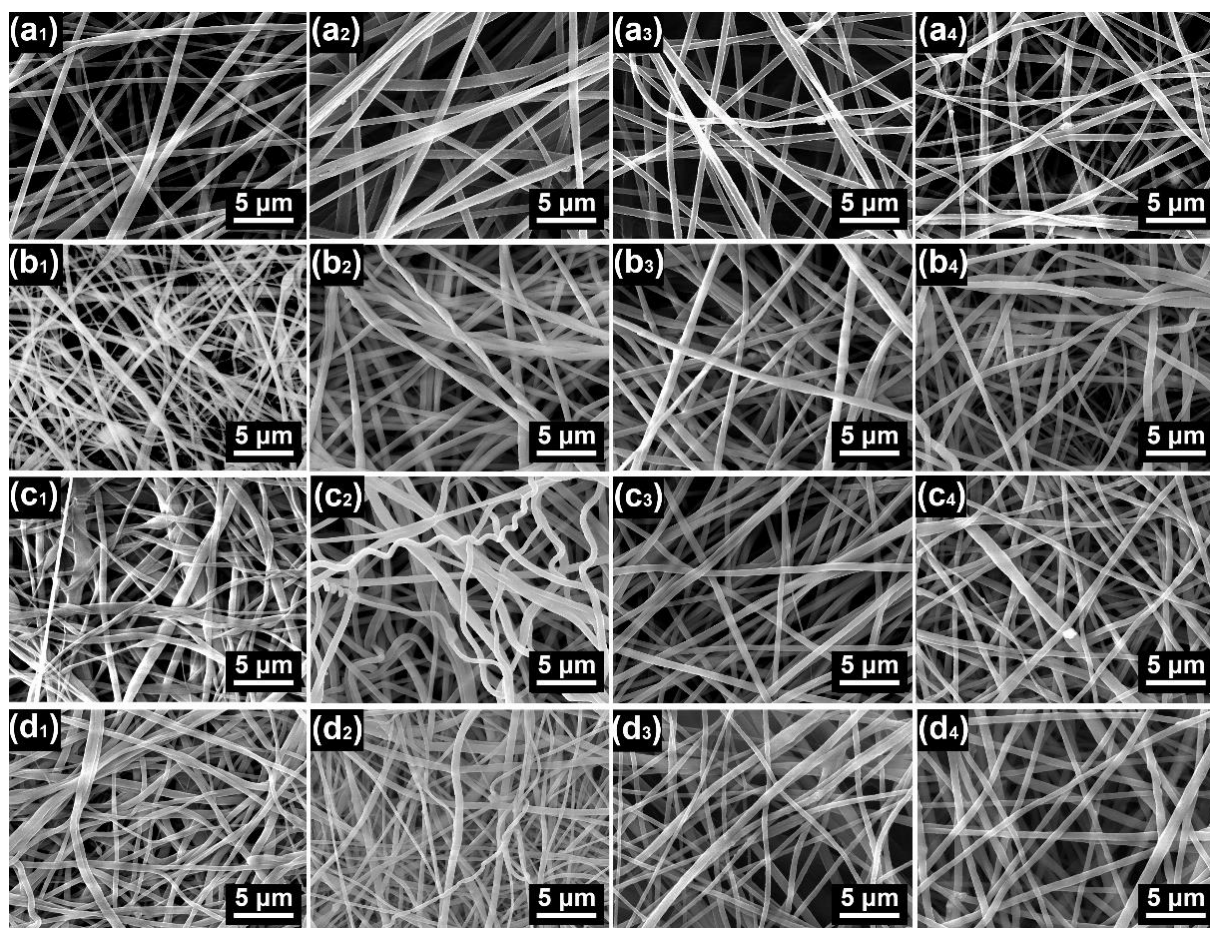


Fig. S10. (a) Original membranes, membranes after 7 d of immersion in (b) acid (pH = 1), (c) neutral (pH = 7), and (d) alkali (pH = 14) (1-4 correspond to the amount of 0,1,5,10 wt% TiO₂ added).

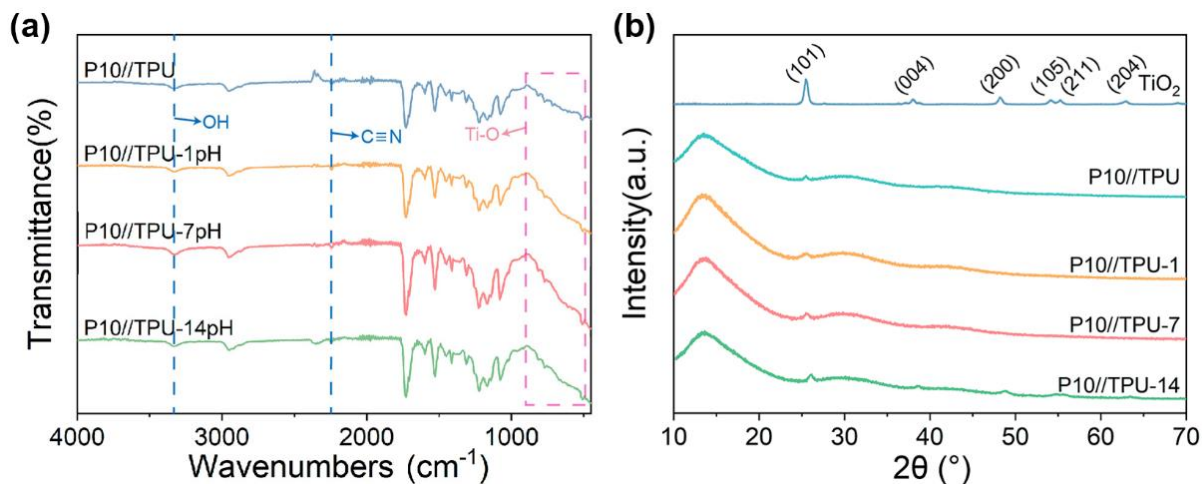


Fig. S11. (a) FTIR spectra; (b) XRD patterns of P10//TPU membranes after 7 d immersion in different pH values.

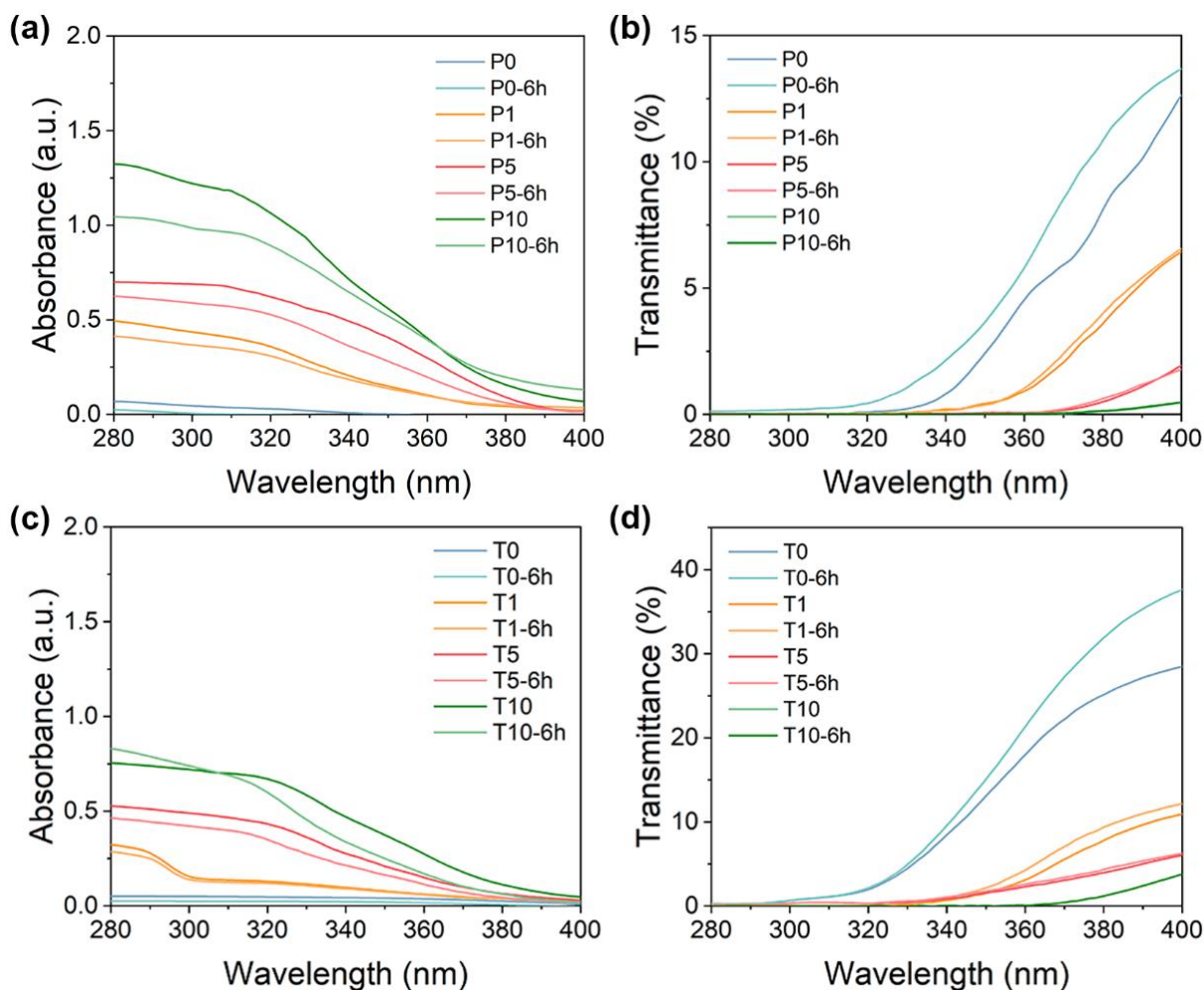


Fig. S12. UV absorption spectra and UV transmission spectra of membranes with different contents of TiO_2 before and after xenon lamp irradiation:(a-b) PAN membranes; (c-d) TPU membranes.

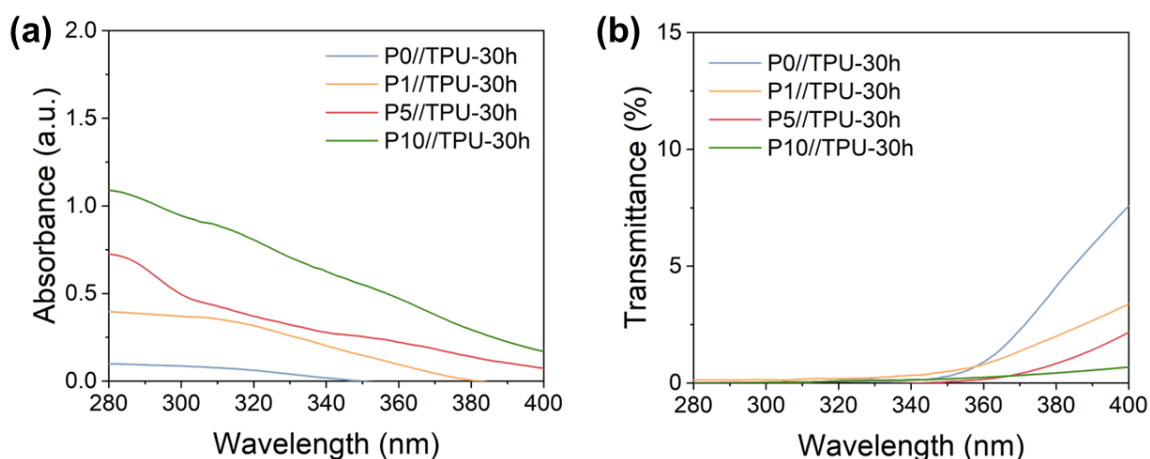


Fig. S13. (a) UV absorption spectra, and (b) UV transmission spectra of Py//TPU membranes after 30 h xenon lamp irradiation.

Table S1: Recent reports on UV resistant electrospinning nanofibers.

Electrospinning methods	Anti-UV additives	UPF	Mechanical Properties (MPa)	References
coaxial	zinc oxide (ZnO)	86.21	3	1
uniaxial	titanium (TiO ₂), UV absorber (UV9)	1690.7	15.1	2
uniaxial	PDMS	185	/	3
uniaxial	UV absorber 329 (UV531), TiO ₂	1352	7.6	4
double needle counter jet	ZnO	1117.67	/	5
uniaxial	UV531, TiO ₂	1485	14.6	6
uniaxial	lignin	/	1.07	7
uniaxial	Silver Nitrate (AgNO ₃)	100 (Equipment ceiling)	/	8
uniaxial	Pearl	968	/	9

REFERENCES

- 1 S. Wang, W. Chen, L. Wang, J. Yao, G. Zhu, B. Guo, J. Militky, M. Venkataraman and M. Zhang, *J. Ind. Eng. Chem.*, 2022, **108**, 449–455.
- 2 K. Liu, L. Deng, T. Zhang, K. Shen and X. Wang, *Ind. Eng. Chem. Res.*, 2020, **59**, 4447–4458.
- 3 J. Li, Y. Li, Y. Lu, W. Shi and H. Tian, *Biomimetics*, 2022, **7**, 217.
- 4 J. Sheng, S. Ding, H. Liao, Y. Yao, Y. Zhai, J. Zhan and X. Wang, *RSC Adv.*, 2023, **13**, 17622–17627.
- 5 H. Zhang, K. Li, C. Yao, J. Gu and X. Qin, *Colloids. Surf. A*, 2021, **629**, 127493.
- 6 Y. Xu, J. Sheng, X. Yin, J. Yu and B. Ding, *J. Colloid. Interf. Sci.*, 2017, **508**, 508–516.
- 7 J. Xu, W. Liu, J. Zhou, Y. Kong, M. Gong, M. Almajarsh, X. Zhao and X. Wang, *Ind. Crop. Prod.*, 2023, **203**, 117175.
- 8 T. Yan, S. Cao, Y. Shi, L. Huang, Y. Ou and R. H. Gong, *Molecules*, 2023, **28**, 6157.
- 9 M. Yu, Z. Chen, B. Xin, X. Liu and W. Xu, *Fibers Polym.*, 2022, **23**, 3022–3027.