Supporting Information

Wiping conditions and fabric properties influenced the microfibers shedding from non-woven products

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Table S1 Detailed comparison of the existing work relating microfibers from non-woven products

Reference	Wiping material	Objective	Factors influencing microfibers shed from wiping	Analysis of microfibers
Lee et al. (2021)[1]	Wet wipes	Explore the discharge of microplastics fibers from wet wipes in aquatic and solid environments	Moisture content and wiping condition (rubbed on the glove or immersed in DI water)	Length, release number and polymer composition
Durukan et al. (2019)[2]	Non-woven wipes and toilet papers	Explore factors of non-woven wipes and toilet papers in relevance to what is flushable	None	Tensile properties, colours, shapes and polymer types
Kwon et al. (2022)[3]	Wipes and meltblown nonwovens	Confirm shedding situation of microfibers from wipes and meltblown nonwovens in air and water environments	None	Width, release number and polymer composition

Table S2 Detailed information of 7 wet wipes and 5 dry wipes.

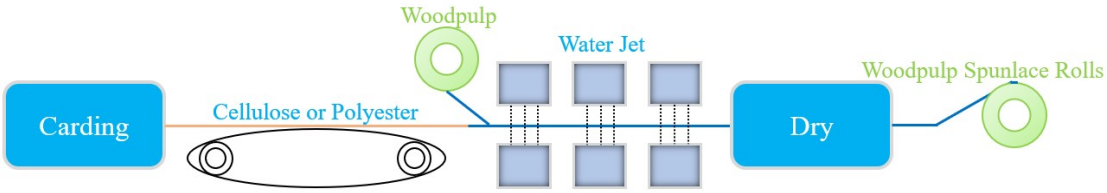
Abbreviation	Condition	Purchase time
W1	Wet	2021.07
W2	Wet	2021.07
W3	Wet	2021.07
W4	Wet	2021.07
W5	Wet	2021.07
W6	Wet	2021.07
W7	Wet	2021.07
D1	Dry	2021.07
D2	Dry	2021.07
D3	Dry	2021.07
D4	Dry	2021.07
D5	Dry	2021.07

Table S3 Detailed information of 4 masks and 2 wipes for comparison.

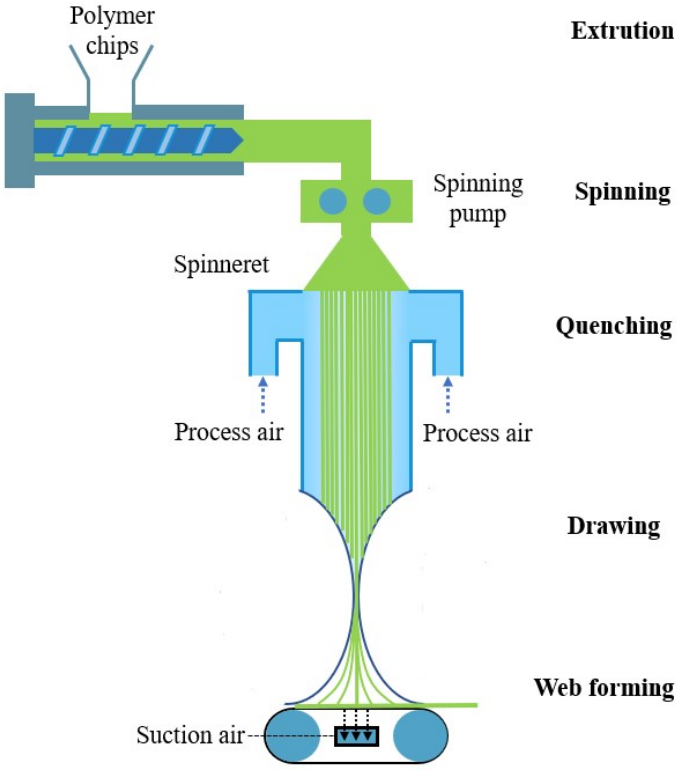
Type	Abbrevation	Condition	Purchase time
Surgical mask	M1	Dry	2020.09
Activated carbon mask	M2	Dry	2021.05
Activated carbon mask	M3	Dry	2021.05
KN95 mask	M4	Dry	2021.05
Wet wipe	W2	Wet	2020.10
Dry wipe	D3	Dry	2021.01

Table S4 Density for different microfibers

Composition	Density (kg/m^3)
Cellulose	1260
Polyethylene terephthalate (PET)	1370
Polypropylene (PP)	900

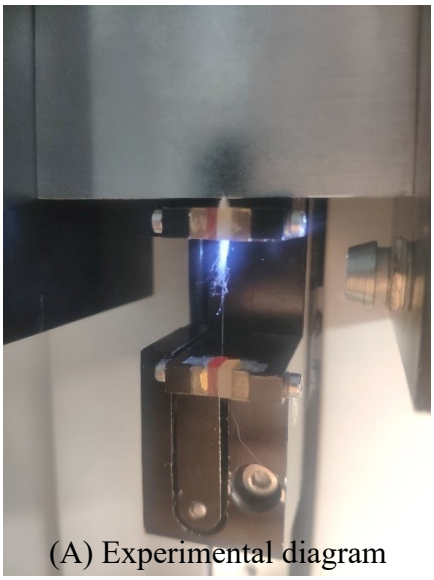


(A) Spunlacing

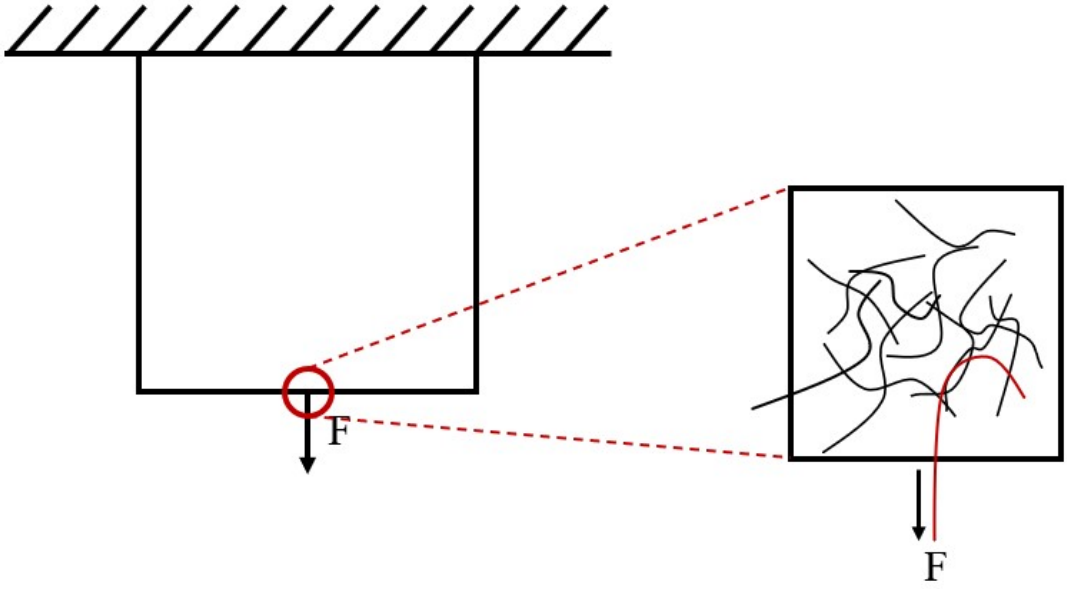


(B) Spunbonding

Figure S1 Schematic diagram of non-woven fabrics manufacturing process. (A) Spunlacing (B) Spunbonding



(A) Experimental diagram



(B) Sketch Map

Figure S2 Schematic diagram of fiber extraction experiment for wipes. (A) Experimental diagram (B) Sketch Map

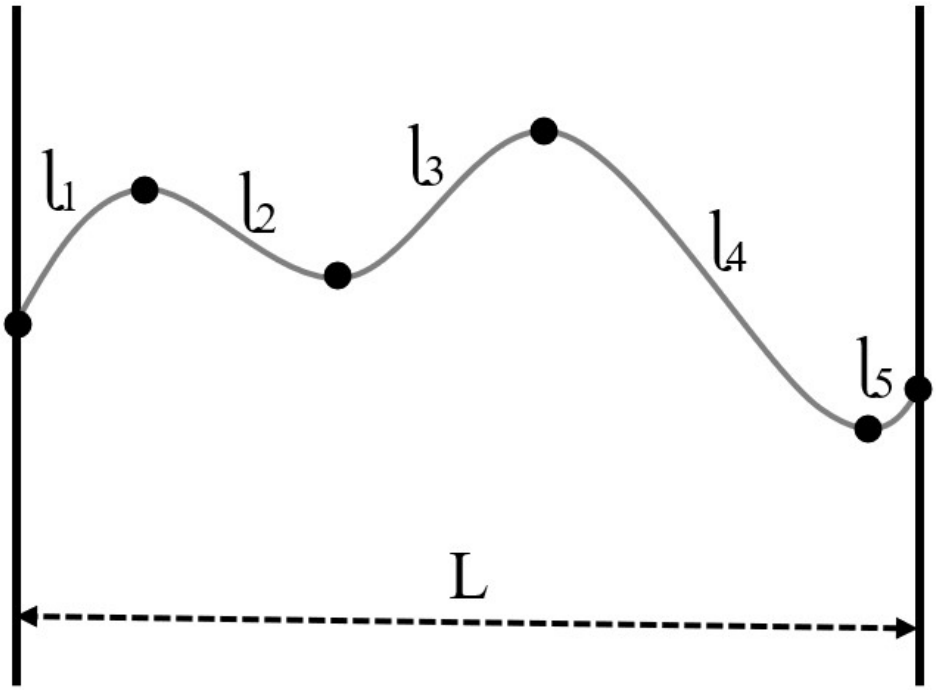


Figure S3 Calculation of bending coefficient

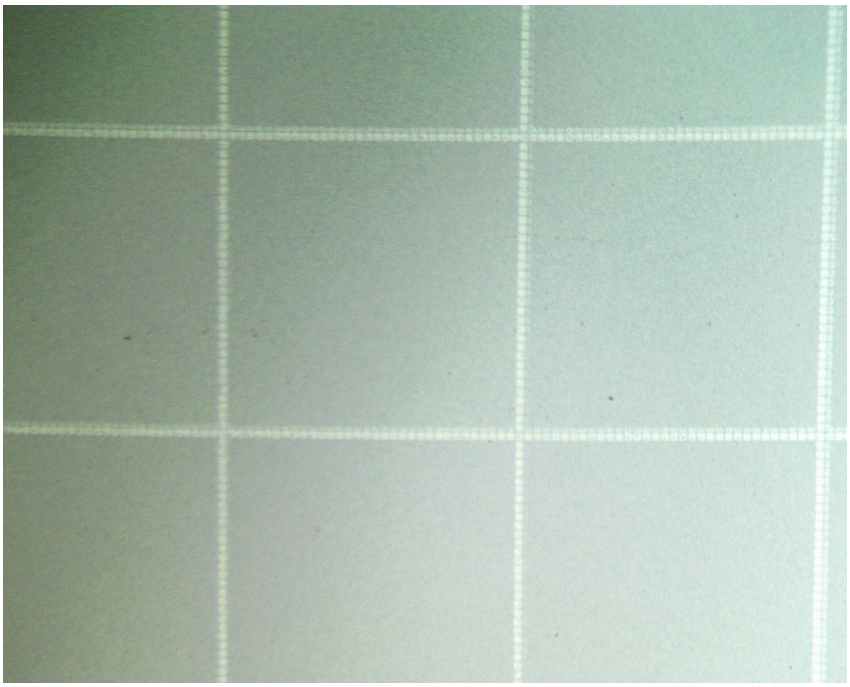


Figure S4 Membrane for the control experiment

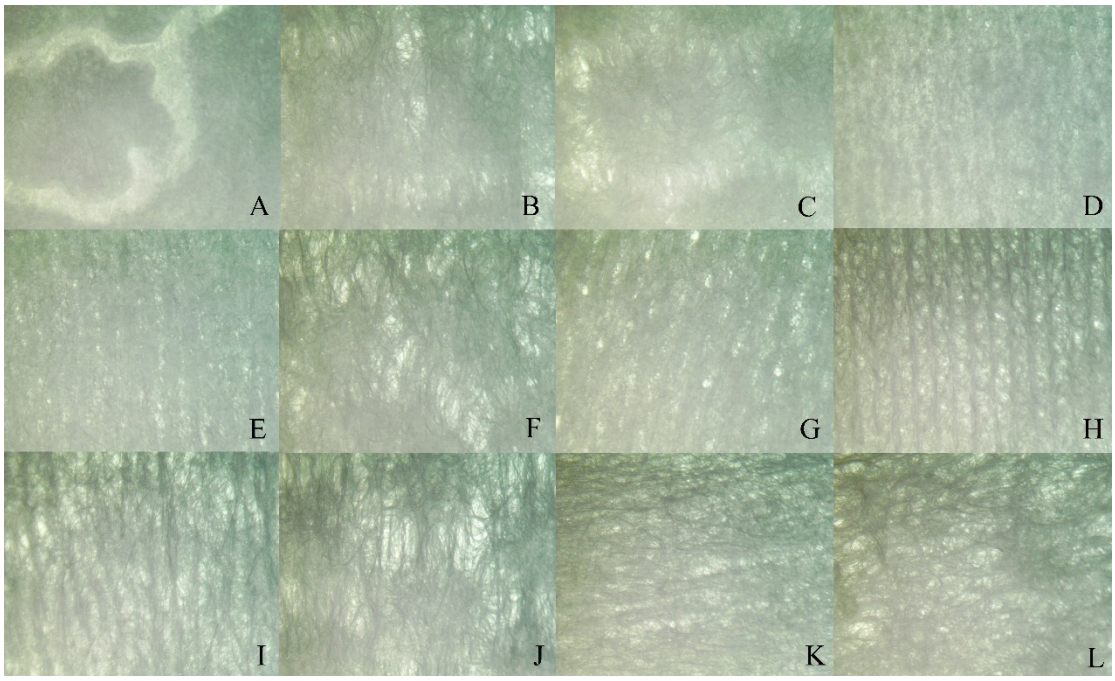


Figure S5 Imaging of wet and dry wipes under 40 times magnification of stereoscope. (A)W1, (B) W2, (C) W3, (D) W4, (E) W5, (F) W6, (G) W7, (H) D1, (I) D2, (J) D3, (K) D4, (L) D5

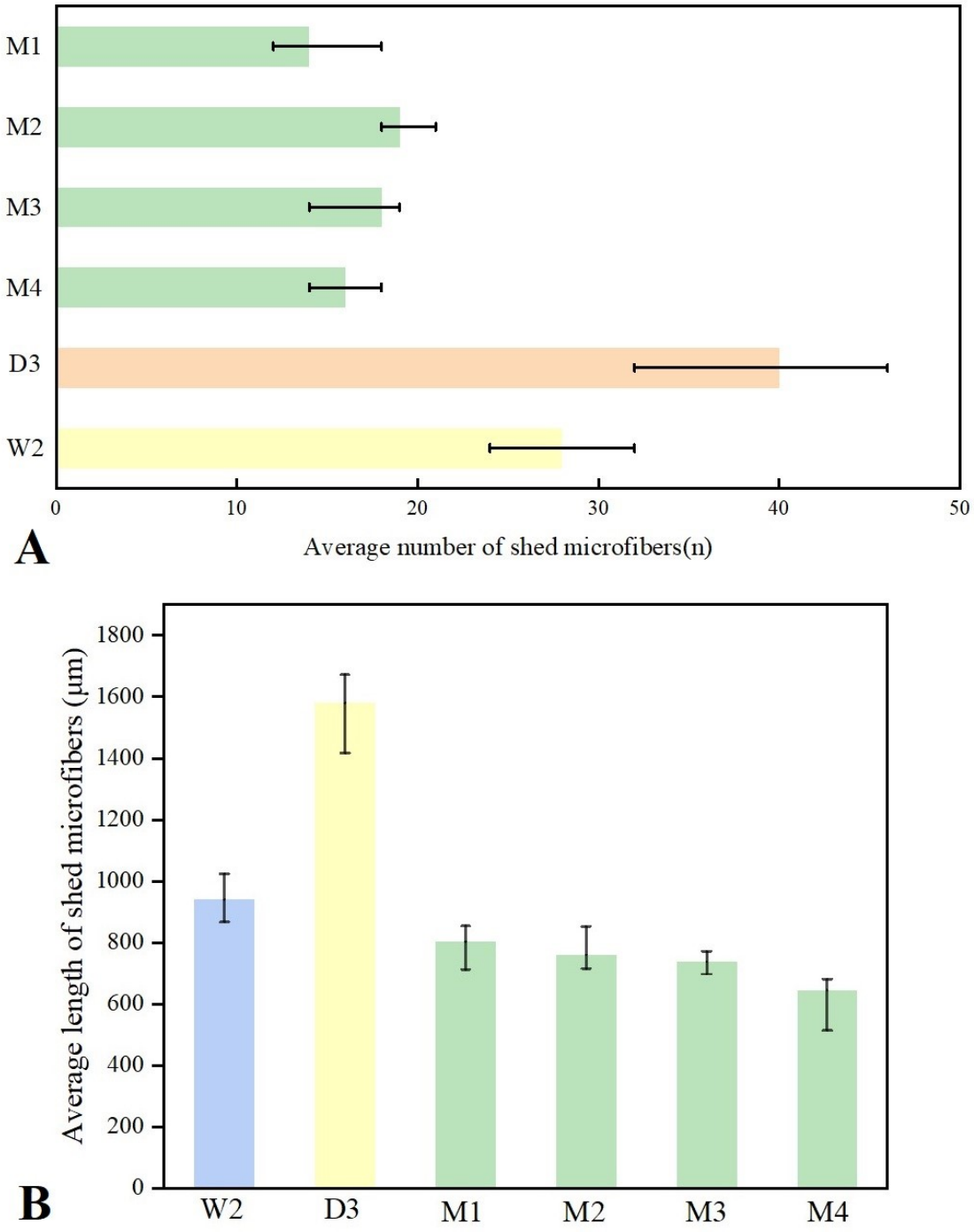


Figure S6 Average number (A) and length (B) of microfibers shed from masks, wet and dry wipes under a 3.92 N wiping force and 10 wiping times.

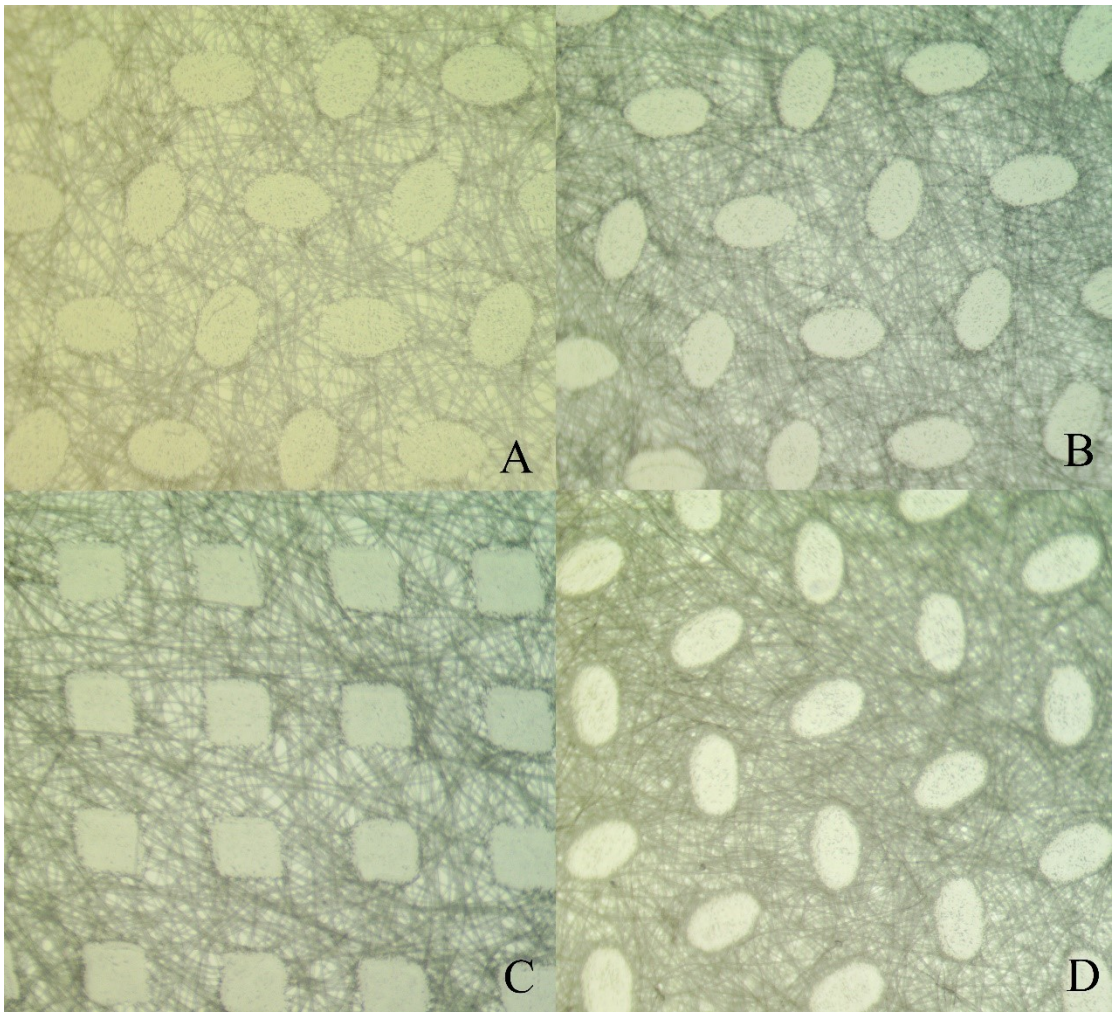


Figure S7 Imaging of masks under 40 times magnification of stereoscope. (A) M1 (B) M2 (C) M3 (D) M4

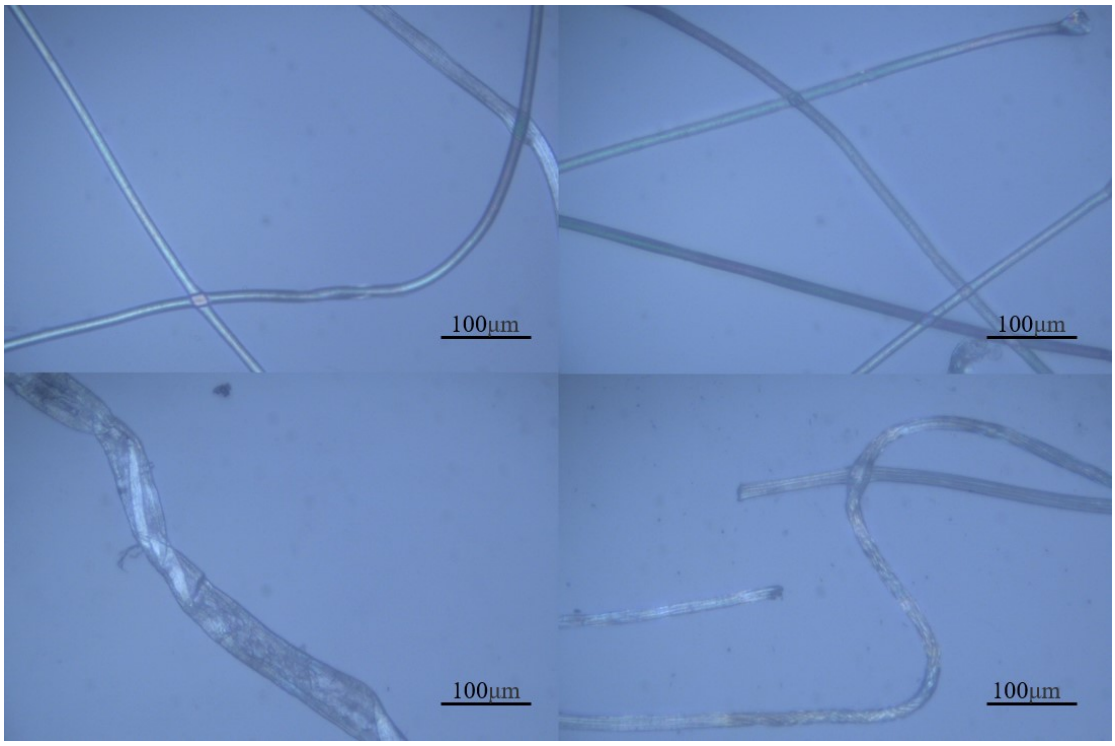


Figure S8 Imaging of exfoliated microfibers under optical microscope (transmission mode)

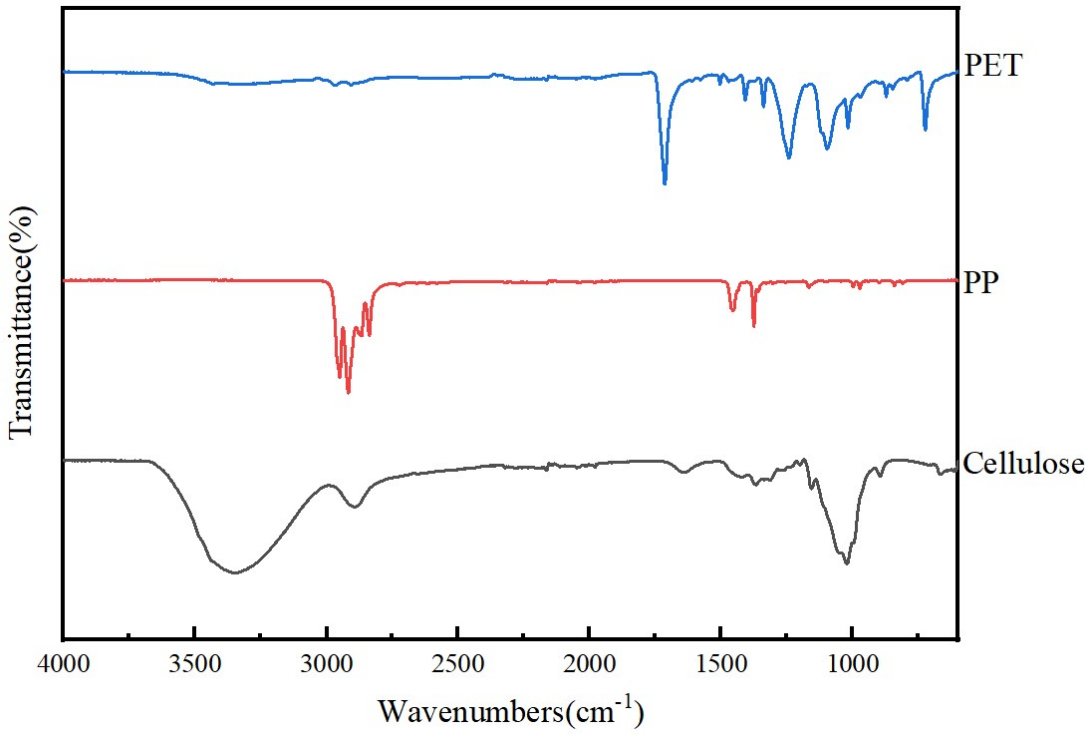


Figure S9 Main infrared matching results of raw wipes and masks

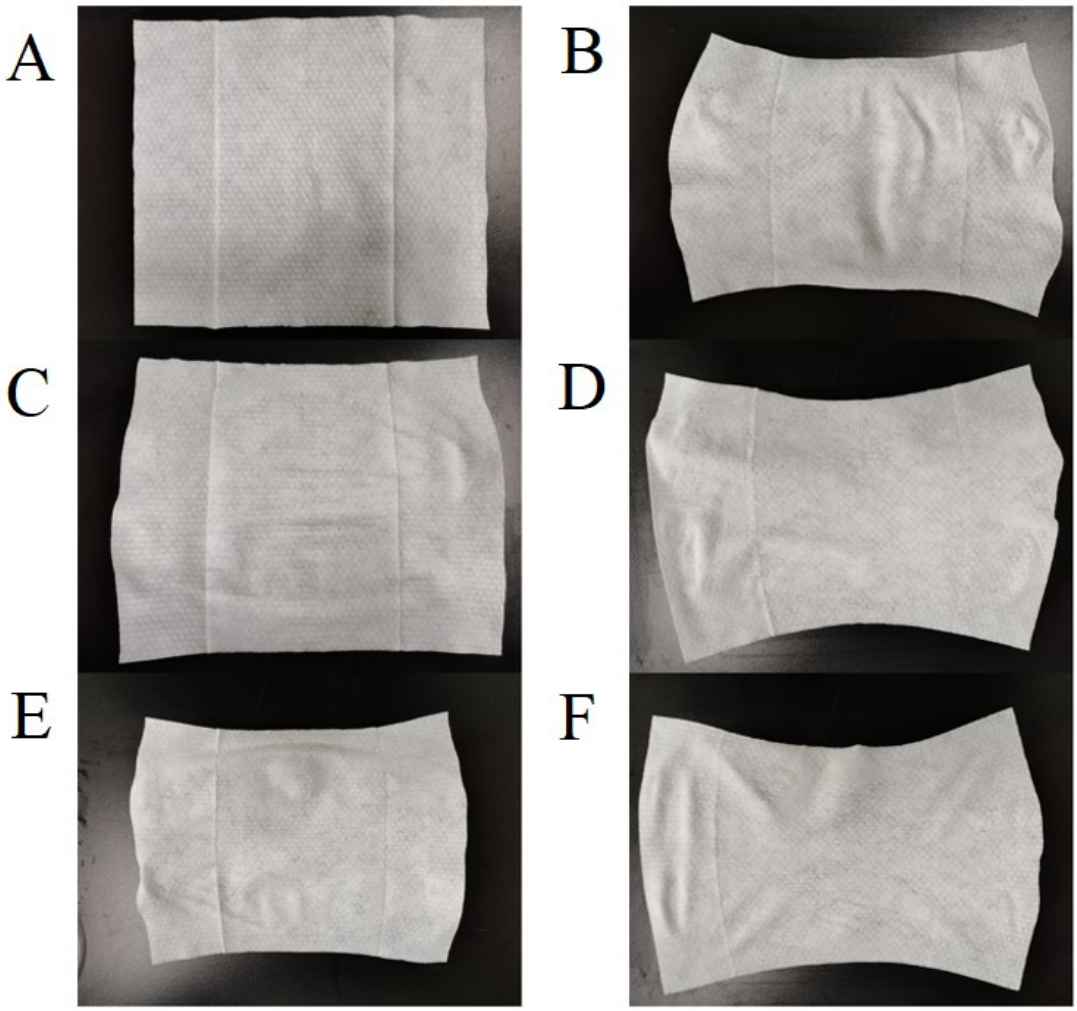


Figure S10 Deformation of the wet wipe under different wiping times and wiping forces. (A) non-wiped, (B) after the wiping process (0.98N, n=10), (C) after the wiping process (3.92N, n=10), (D) after the wiping process (6.86N, n=10), (E) after the wiping process (9.8N, n=10), (F) after the wiping process (3.92N, n=55)

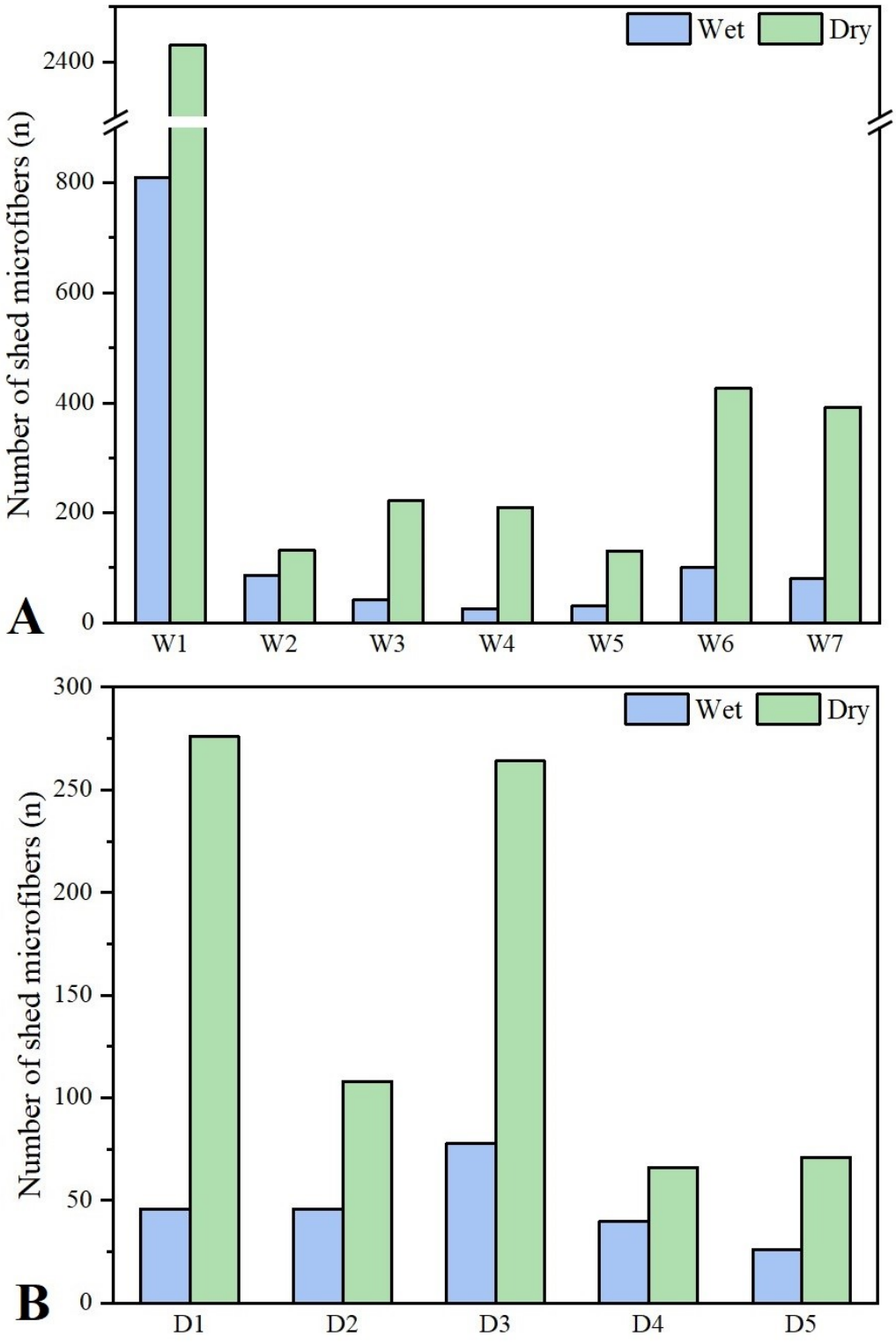


Figure S11 Number of microfibers shed in the wiping process of wet wipes (A) and dry wipes (b) under wet or dry conditions. (10 times, 9.8 N)

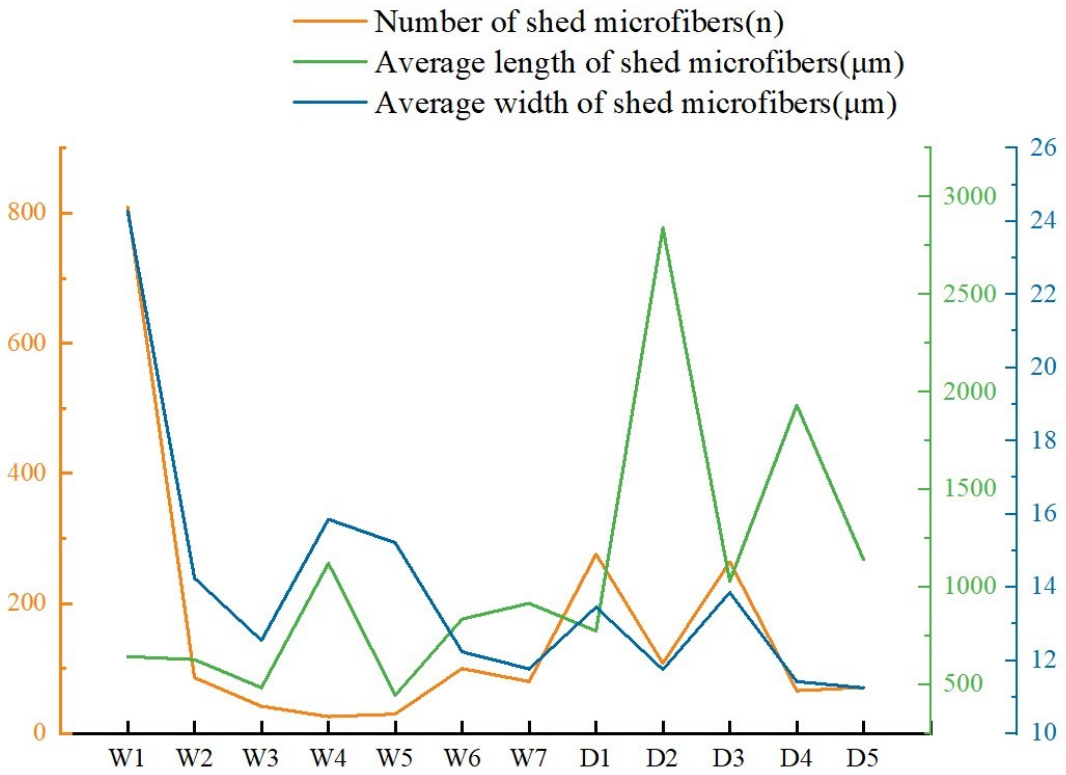


Figure S12 Length, width and quantity of exfoliated microfibers from 12 wipes

Reference:

1. J. Lee, S. Jeong and K.-J. Chae, Discharge of microplastics fibres from wet wipes in aquatic and solid environments under different release conditions, *Science of The Total Environment*, 2021, **784**, 147144.

2. S. Durukan and F. Karadagli, Physical characteristics, fiber compositions, and tensile properties of nonwoven wipes and toilet papers in relevance to what is flushable, *Science of The Total Environment*, 2019, **697**, 134135.

3. S. Kwon, M. C. Zambrano, R. A. Venditti, R. Frazier, F. Zambrano, R. W. Gonzalez and J. J. Pawlak, Microfiber shedding from nonwoven materials including wipes and meltblown nonwovens in air and water environments, *Environmental Science and Pollution Research*, 2022, DOI: 10.1007/s11356-022-20053-z.