

Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.
This journal is © The Royal Society of Chemistry 2018

Electronic Supplementary Information

Morphology Engineering of Protein Fabrics for Advanced and Sustainable Filtration

Xin Fan^{a,b,c}, Yu Wang^{*b}, Min Zheng^b, Francis Dunne^b, Tian Liu^b, Xuewei Fu^b, Lushi
Kong^d, Siyi Pan^{*a,c} and Wei-Hong Zhong^{*b}

^a College of Food Science and Technology, Huazhong Agricultural University, No. 1
Shizishan Road, Wuhan, Hubei, 430070, PR China

^b School of Mechanical and Materials Engineering, Washington State University, 100
Dairy Road, Pullman, WA, 99164, USA

^c Key Laboratory of Environment Correlative Dietology (Huazhong Agricultural
University), Ministry of Education, No. 1 Shizishan Road, Wuhan, Hubei, 430070, PR
China

^d College of Materials Science and Engineering, Beijing University of Chemical
Technology, North Third Ring Road, Beijing, 100029, PR China

Corresponding Authors:

Yu Wang (yu.wang3@wsu.edu)

Siyi Pan (pansiyi@mail.hzau.edu.cn)

Wei-Hong Zhong (katie_zhong@wsu.edu)

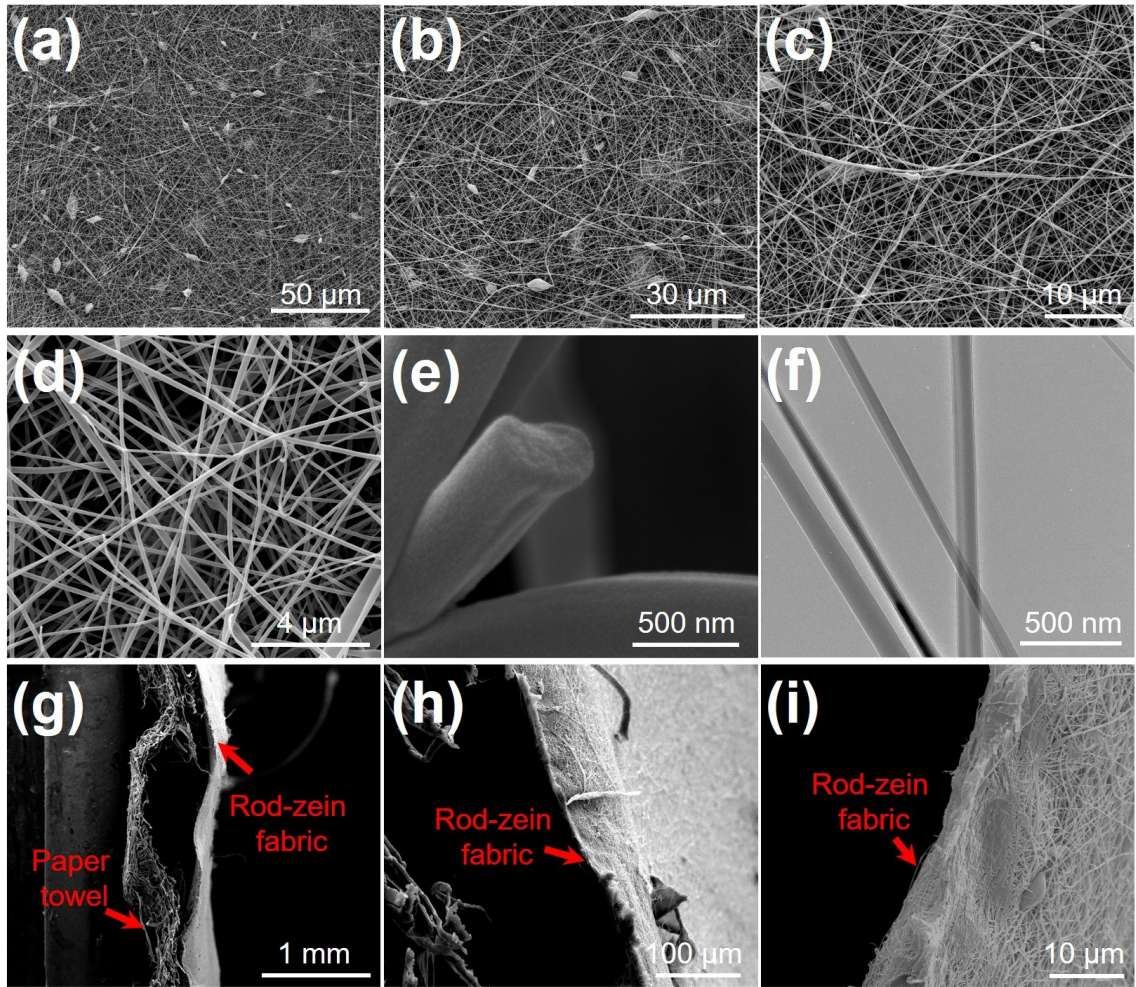


Fig. S1. (a-e) and (g-i) SEM and (f) TEM images of the rod-zein fibres by electrospinning of the stable zein solution in AA/DI.

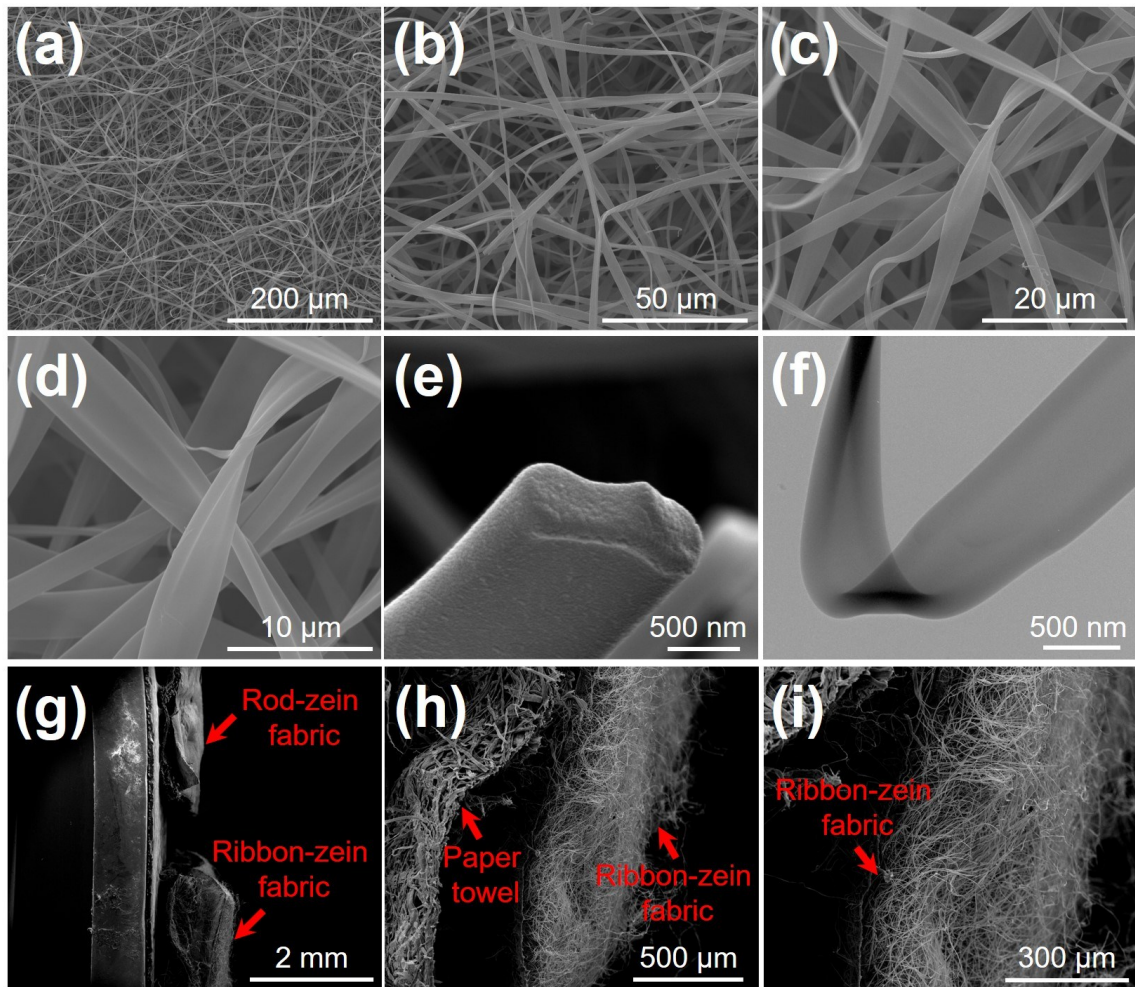


Fig. S2. (a-e) and (g-i) SEM and (f) TEM images of the self-curved ribbon-zein fibre by electrospinning of the metastable zein solution in acetone/butanol/DI.

Table S1. The porosity, normalized pressure drop and quality factor of rod- and ribbon-zein air-filter.

	Ribbon-Zein air-filter	Rod-Zein air-filter
Porosity (%)	82.45	32.53
Normalized pressure drop (kPa/g)	4.148	53.997
Quality factor (Pa ⁻¹)	0.075	0.004

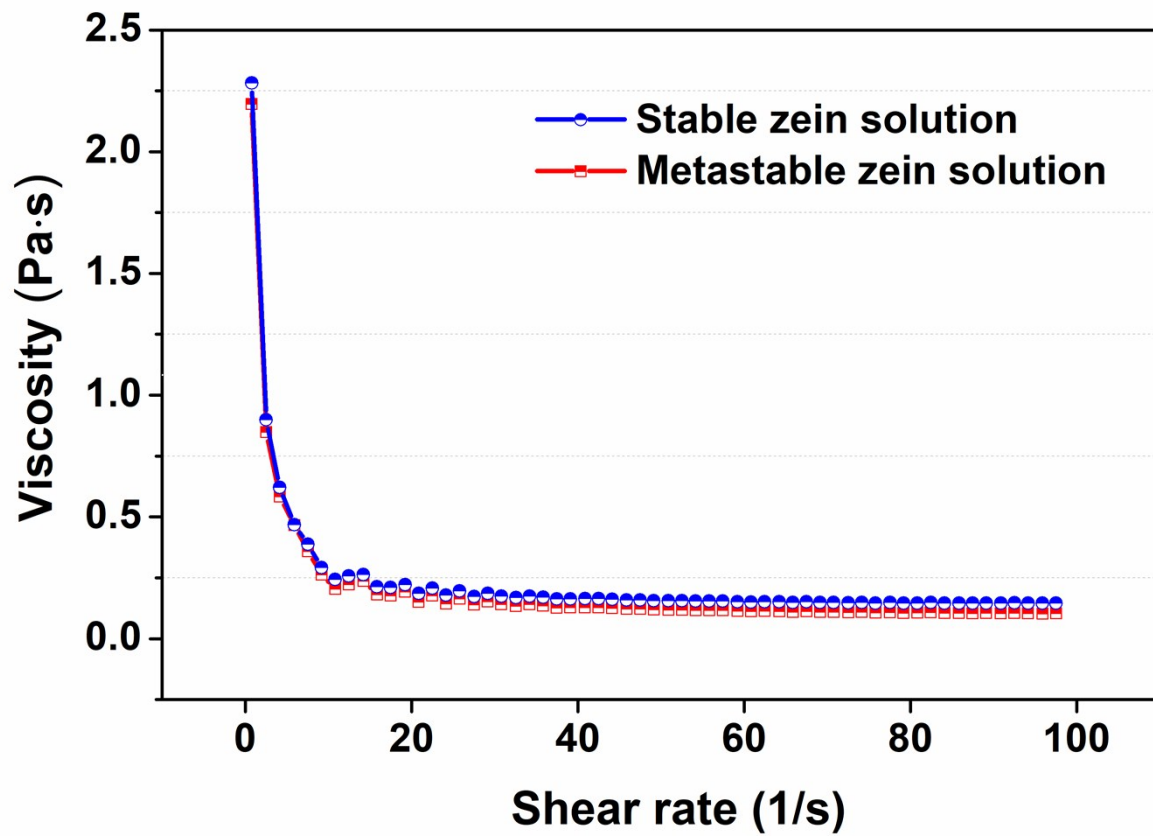


Fig. S3. Viscosity vs. shear rate for the stable and metastable zein solutions.

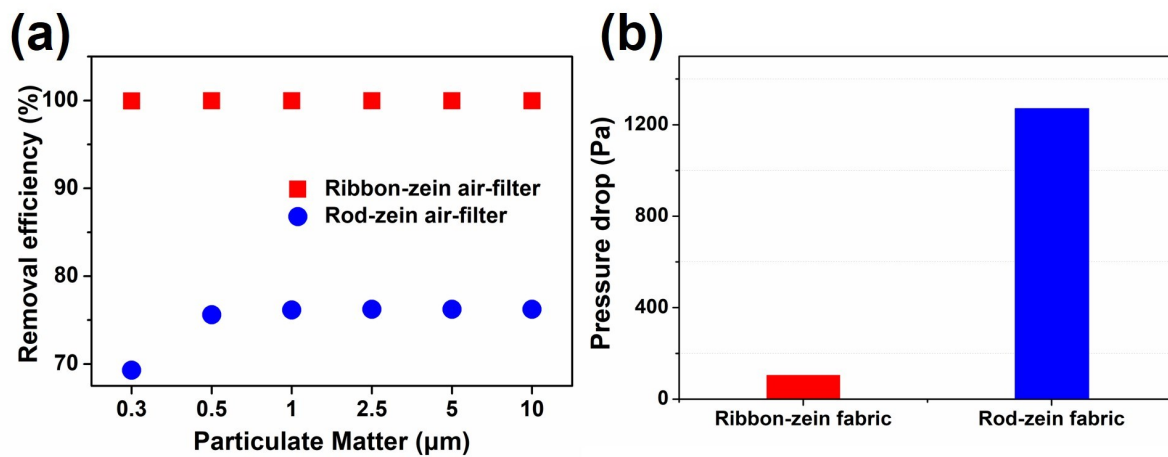


Fig. S4. (a) The PM removal efficiencies for the ribbon- and rod-zein air-filter at the same pressure drop (ca. 110 Pa); (b) The pressure drop of ribbon- and rod-zein air-filter at the same level efficiency for PM_{0.3} (ca. 99.9%).

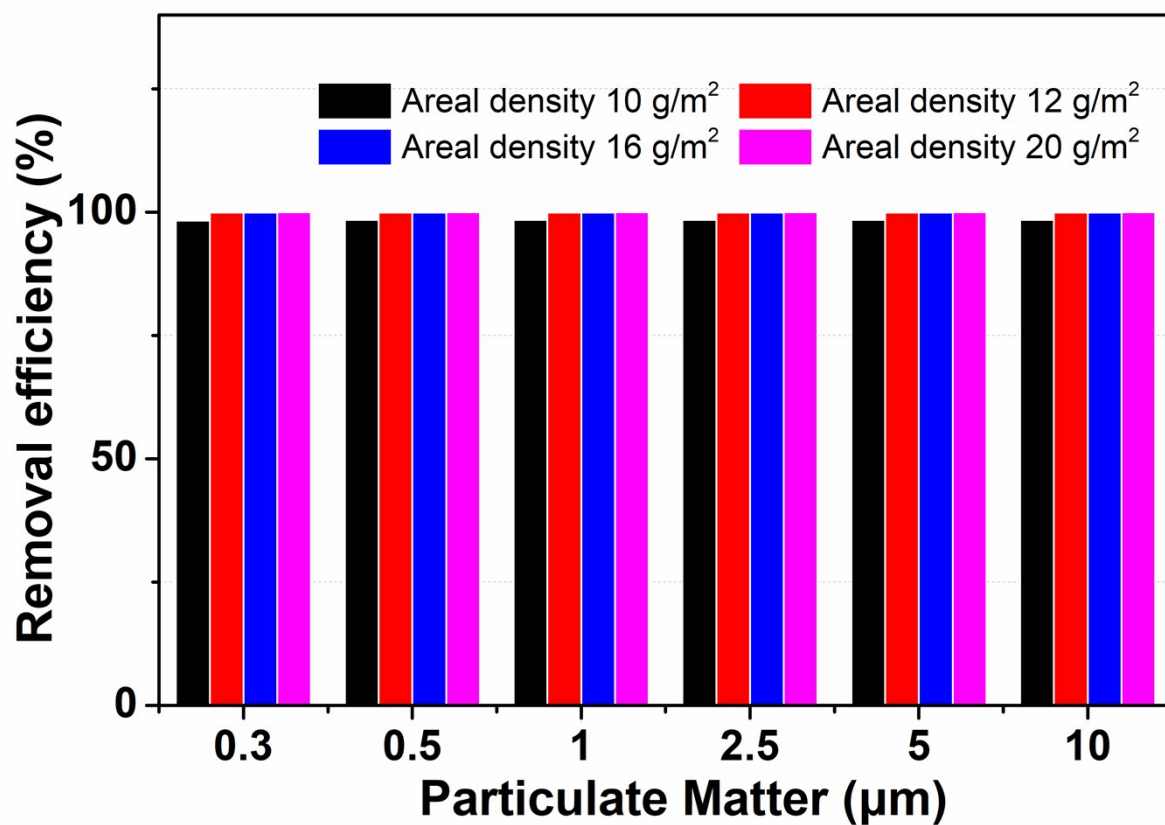


Fig. S5. The PM removal efficiencies for the ribbon-zein air-filter with different areal density: 10, 12, 16 and 20 g/m².

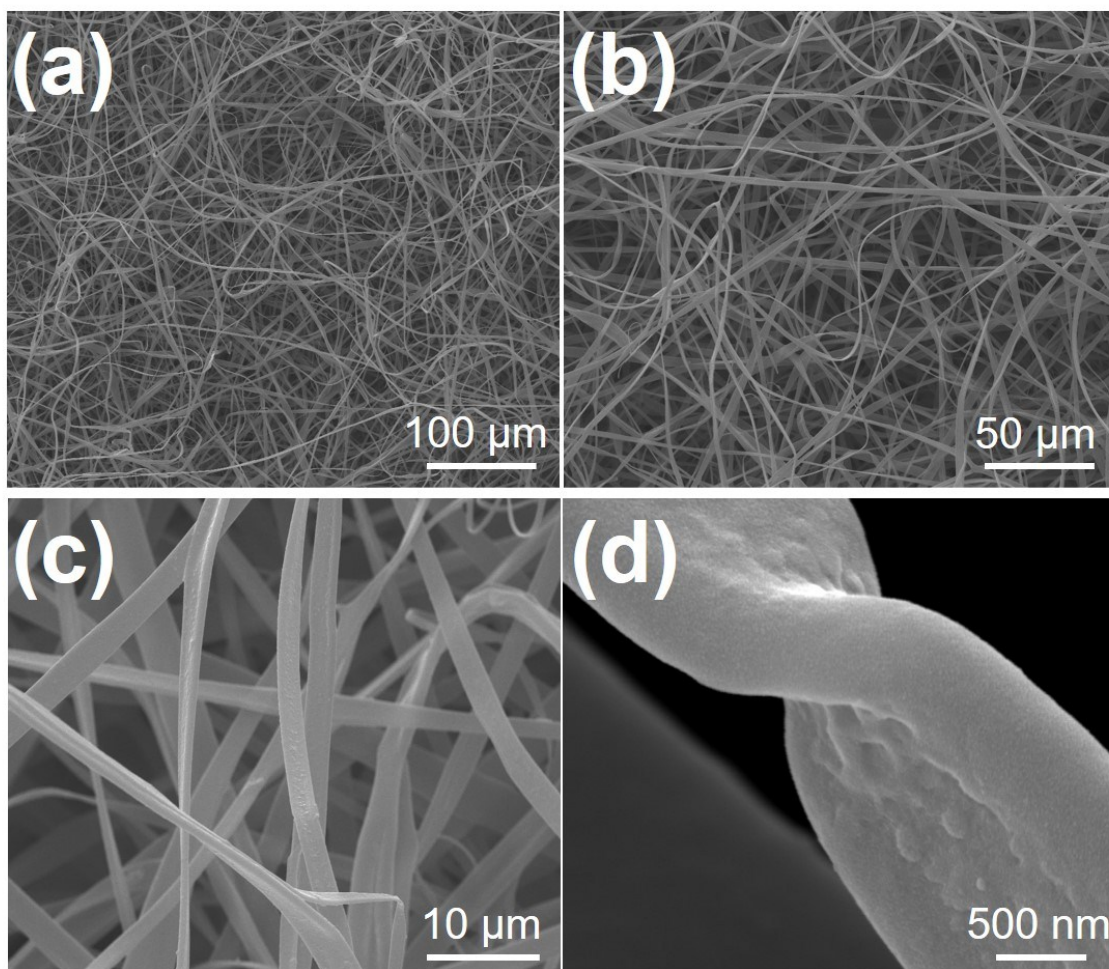


Fig. S6. (a-d) SEM images of ribbon-zein air-filter after filtration.

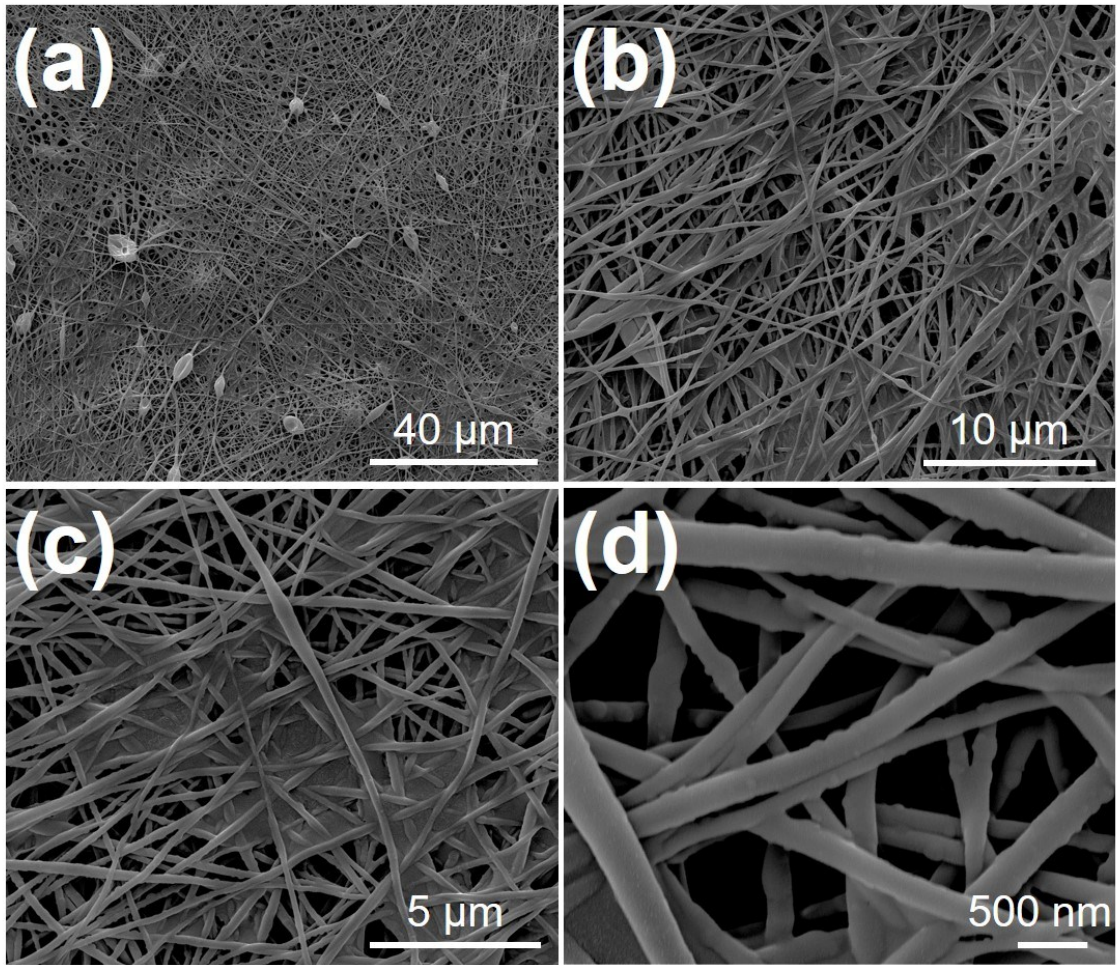


Fig. S7. (a-d) SEM images of rod-zein air-filter after filtration.

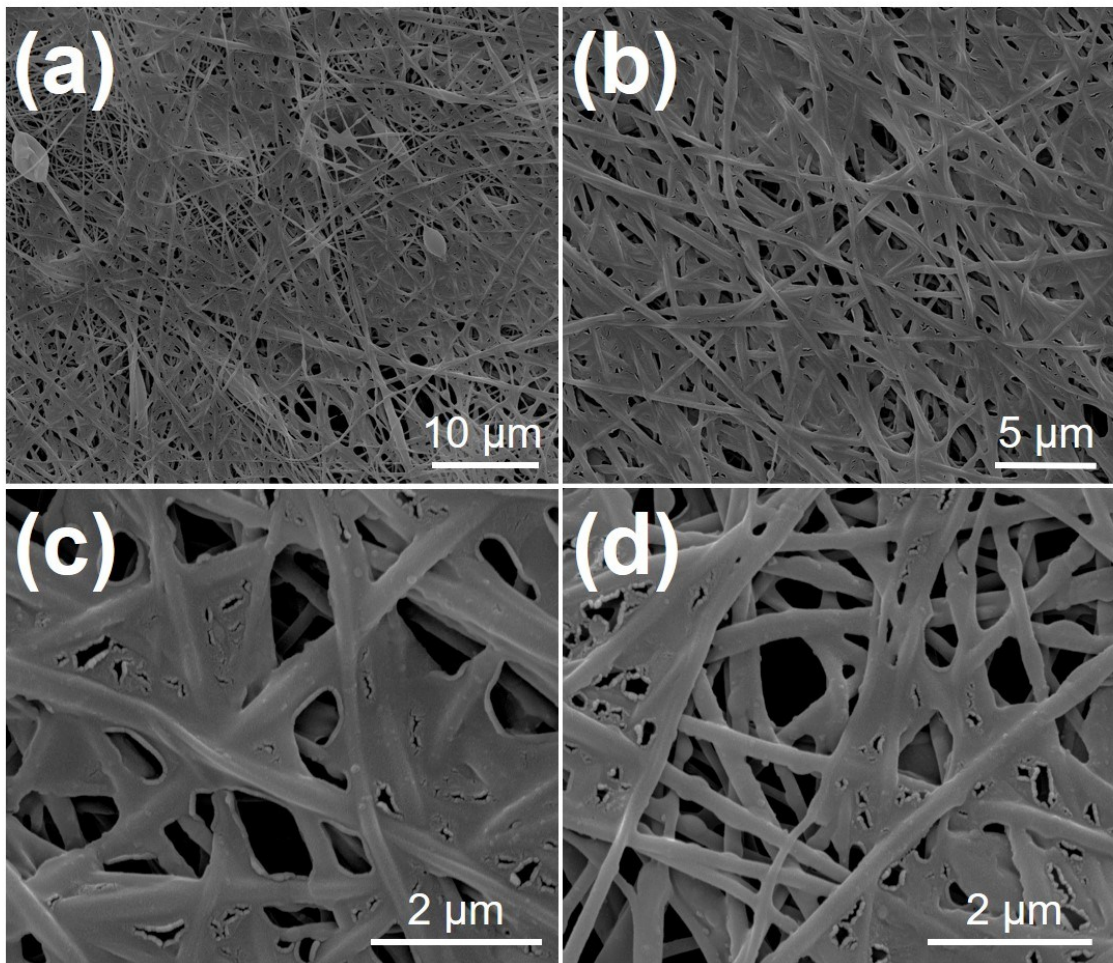


Fig. S8. (a-d) SEM images of commercial air-filter after filtration.