Electronic Supplementary Information for:

Superhydrophobic poly(lactic acid) electrospun nanofibrous membrane surface-functionalized with TiO_2 nanoparticles and methyltrichlorosilane for oil/water separation and dye adsorption

Zixuan Zhou, Lejing Liu, Weizhong Yuan*

Shanghai Tenth People's Hospital, School of Medicine, School of Materials Science and Engineering, Tongji University, Shanghai 201804, People's Republic of China. E-mail: yuanwz@tongji.edu.cn (W. Yuan). Tel: +86 21 69580234, Fax: +86 21 69584723

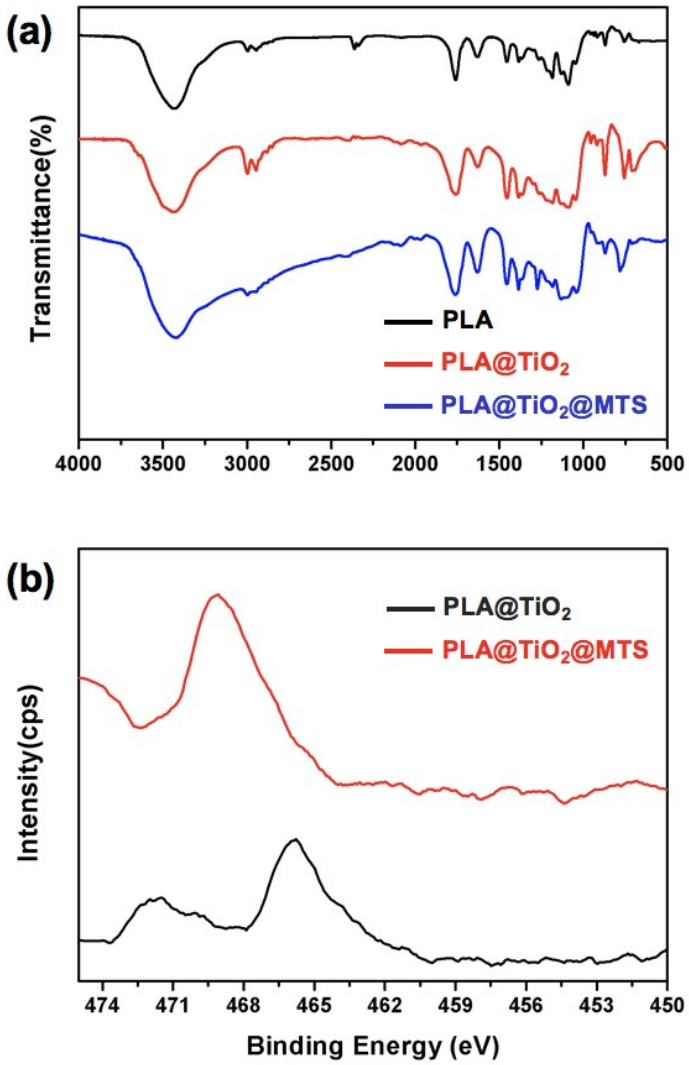

Fig. S1 (a) FT-IR spectra of PLA, PLA@TiO_2, PLA@TiO_2@MTS, and (b) X-ray photoelectron spectroscopy (XPS) of titanium.

Table S1 The relationship between the permeate flux and the thickness of the membrane.

Type of oil	The thickness of the membrane (nm)	The permeate flux ($Lm^2\ h^{-1}$)
soybean oil	150	406.9±68.7
	180	517.1±93.2
	200	608.3±57.7
n-hexane	150	1837.8±35.9
	180	2297.6±51.6
	200	2499.8±47.6

The relationship between film thickness and flux is:

$J = (\varepsilon \pi r_p^2 \Delta p)/8\mu L$

where J is the permeation flux, ε is the porosity of the medium, r_p is the effective pore radius, Δp is the pressure, μ is the viscosity of the liquid, and L is the thickness of the membrane.

Table S2 Comparison of oil-water separation efficiency of different materials.

Oil-water separation material	Oil-water separation efficiency (%)	Reference
PLA@TiO_2@MTS electrospun nanofiber membrane (this work)	98.4	
LDH/cellulose membrane	95	Ref. 1
Filter paper coated with polystyrene grain, polyethylene terephthalate, silica	>96	Ref. 2
Melamine sponge coated with chitosan-sodium	96	Ref. 3

perfluorononanoate and Fe_3PO_4	

Table S3 Comparison of adsorption of methylene blue by different materials.

MB adsorption Material	The adsorption capacity of MB (mg/g)	Reference
PLA@TiO_2@MTS electrospun nanofiber membrane (this work)	236.25	
Crosslinked sericin/β-cyclodextrin/poly(vinyl alcohol) composite nanofibers	187.97	Ref. 4
MOF/graphite oxide hybrid material	183.49	Ref. 5
PU/10GO electrospun membrane	109.8	Ref. 6

We used the formula (1) to conduct a comparison test of methylene blue adsorption capacity:

$$q_t = \frac{C_0 - C_e}{m} V \quad (1)$$

where C_0 is the initial and C_e is the equilibrium concentration of MB in mg/L, m is the adsorbent mass in g and V is the volume of MB solution in L.

References

1 X. Yue, J. Li, T. Zhang, F. Qiu, D. Yang and M. Xue, In situ one-step fabrication of durable superhydrophobic-superoleophilic cellulose/LDH membrane with hierarchical structure for efficiency oil/water separation, *Chem. Eng. J.* 2017, 328, 117-123.

2 S. Wang, M. Li and Q. Lu, Filter Paper with Selective Absorption and Separation of Liquids that Differ in Surface Tension, *ACS Appl. Mater. Interfaces* 2010, 2, 677-683.

3 C. Su, H. Yang, S. Song, B. Lu and R. Chen, A magnetic superhydrophilic/oleophobic sponge for continuous oil-water separation, *Chem. Eng. J.* 2017, 309, 366-373.

4 R. Zhao, Y. Wang, X. Li, B. Sun and C. Wang, Synthesis of beta-Cyclodextrin-Based Electrospun Nanofiber Membranes for Highly Efficient Adsorption and Separation of Methylene Blue, *ACS Appl. Mater. Interfaces* 2015, 7, 26649-26657.

5 L. Li, X.L. Liu, H.Y. Geng, B. Hu, G.W. Song and Z.S. Xu, A MOF/graphite oxide hybrid (MOF: HKUST-1) material for the adsorption of methylene blue from aqueous solution, *J. Mater. Chem. A* 2013, 1, 10292-10299.

6 S.P. Sundaran, C.R. Reshmi, P. Sagitha, O. Manaf and A. Sujith, Multifunctional graphene oxide loaded nanofibrous membrane for removal of dyes and coliform from water, *J. Environ. Manage.* 2019, 240, 494-503.