# Supporting Information

Conferring doorman characteristic and superior nano-scratch stability to graphene oxide membrane via tailoring channel microenvironment

Wenting Meng[a], Nan Li[a*], Chunying Min[b], Jie Shi[a], Bo Zhu[a], Liangsen Liu[a], Shengkai Liu[a], Ruiqi Shao[a], Zhiwei Xu[a*], Zhijiang Cai[a]

[a]State Key Laboratory of Separation Membranes and Membrane Processes, School of Textile Science and Engineering, Tiangong University, Tianjin 300387, China

[b]Research School of Polymeric Materials, School of Materials Science & Engineering, Jiangsu University, Zhenjiang, Jiangsu 212013, China
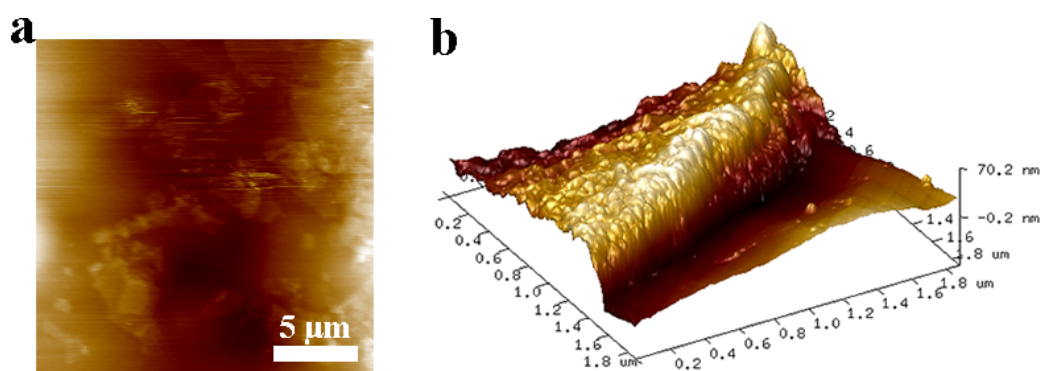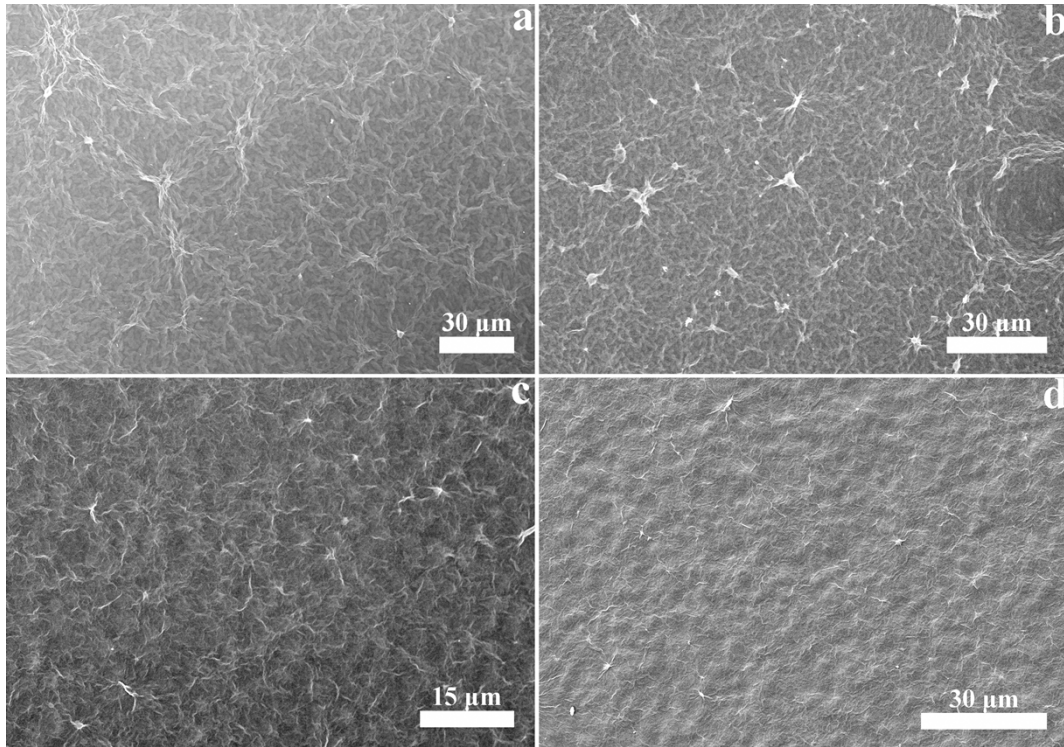
Fig. S1. (a) AFM image of GO nanosheets which drop on a mica substrate. (b) 3D AFM height image of functional layer.
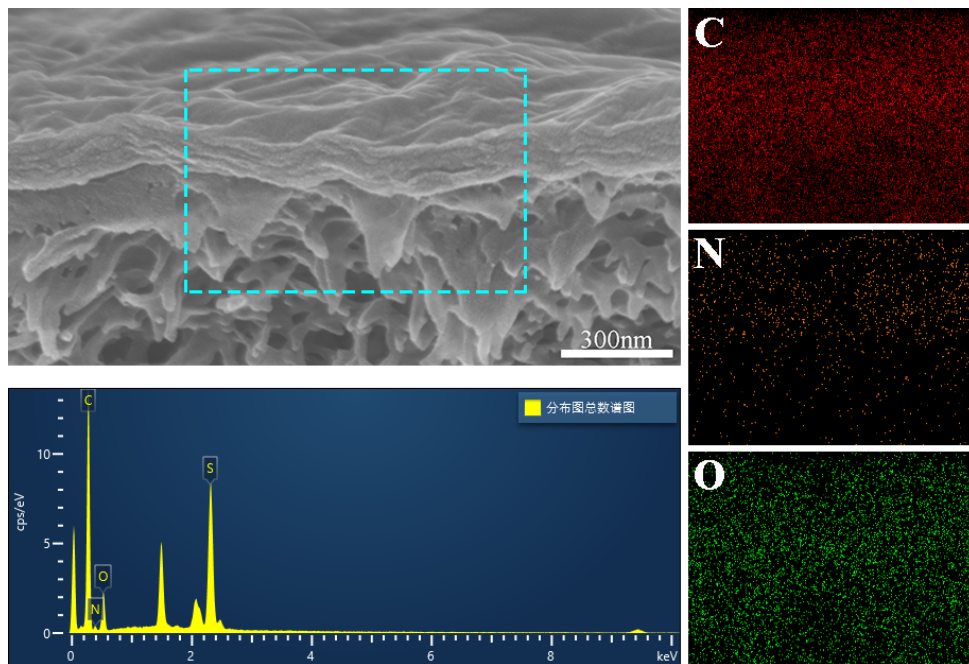
Nan Li, E-mail: linan@tiangong.edu.cn, Tel/Fax: +86 022 83955527
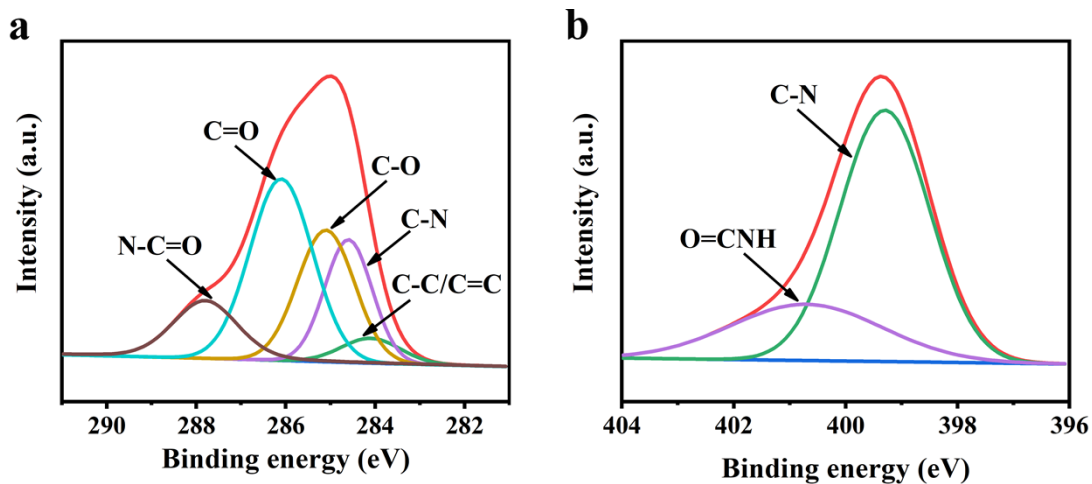
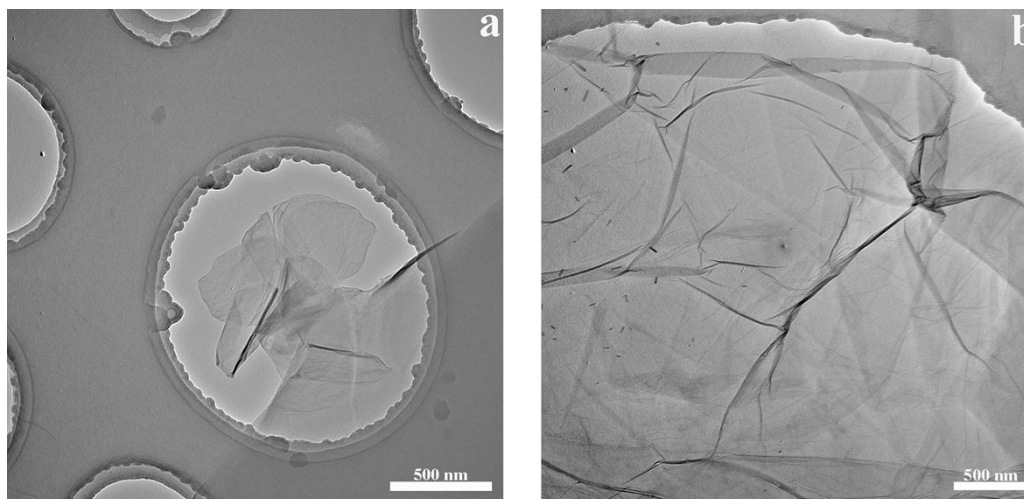Zhiwei Xu, E-mail: xuzhiwei@tiangong.edu.cn, Tel/Fax: +86 022 83955231

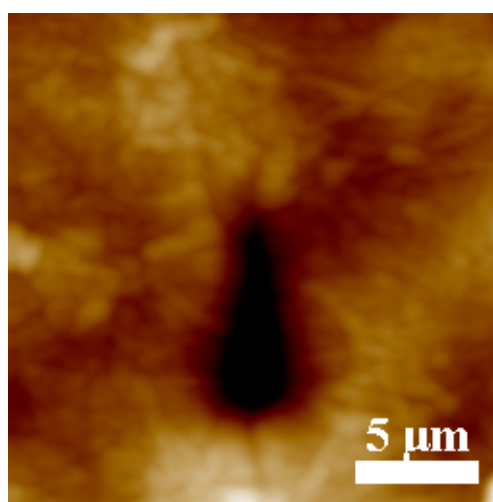**Fig. S2.** SEM surface images of (a) GO, (b) GO-PEI-8, (c) GO-PEI-15 and (d) GO-PEI-30 membranes.

Fig. S3. EDS images of GO-PEI membrane.

Fig. S4. XPS spectra of (a) C 1s and (b) N 1s spectra for GO-PEI-30 membrane.

Fig. S5. TEM images of SGO and LGO nanosheets.

Fig. S6. AFM image of GO-PEI membrane after nano-scratch.

Table S1. Permeance and rejection values of GO and GO-PEI membranes.

Sample	Permeance	Rejection
GO	20.36	98.54
GO-PEI-8	56.07	96.94
GO-PEI-10	65.82	95.77
GO-PEI-15	67.21	90.37
GO-PEI-30	54.19	94.90

Table S2. Permeance and rejection values of GO and GO-PEI membranes at pH 2 and pH 12.

Sample	Permeance		Rejection	
	pH 2	pH 12	pH 2	pH 12
GO	15.20	18.15	99.81	99.12
GO-PEI	58.31	54.63	98.37	86.79