

SUPPORTING INFORMATION

Ultrafast molecular sieving through functionalized graphene membranes

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Supplementary figures.



Figure S1. Ten litre GnP aqueous solution with a concentration of 0.5 mg/ml storage for 1 month at room temperature.

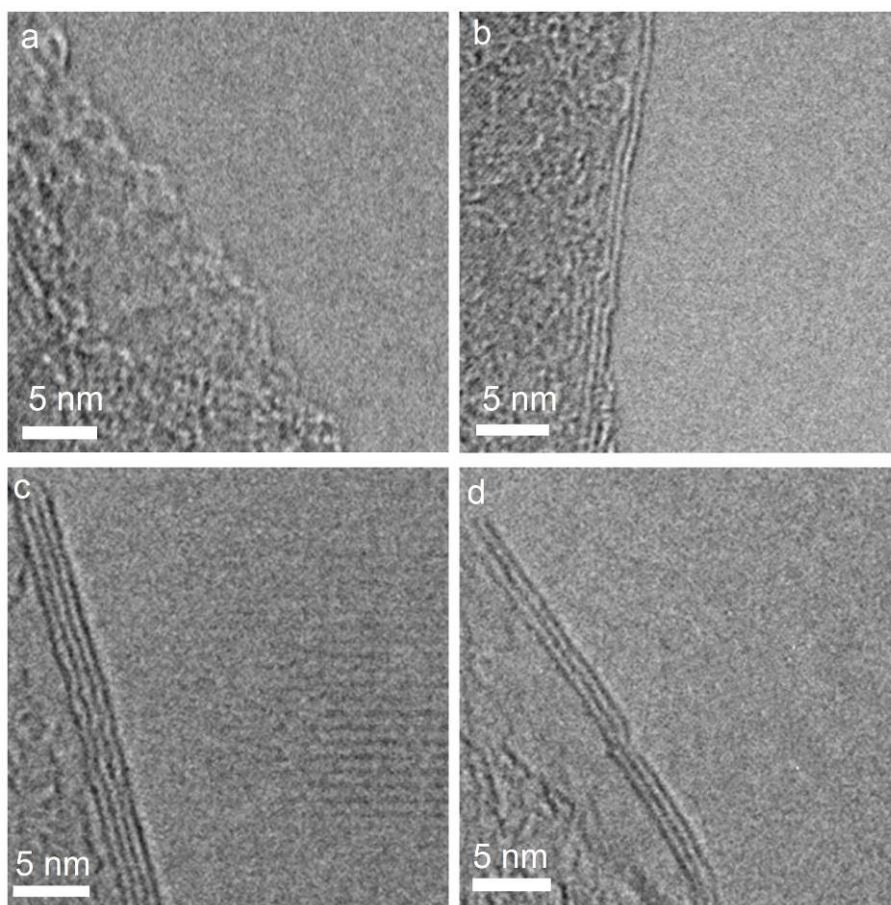


Figure S2. HRTEM images of GnP.

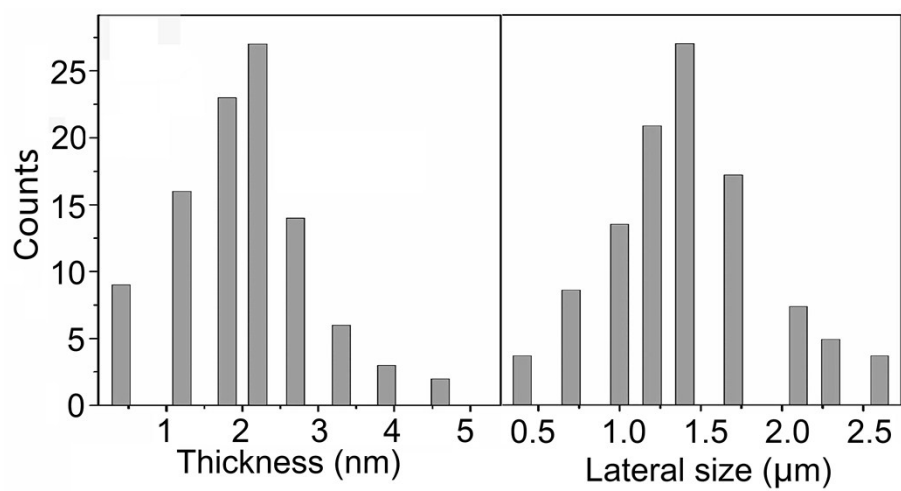


Figure S3. The thickness and lateral size distribution of the large GnP.

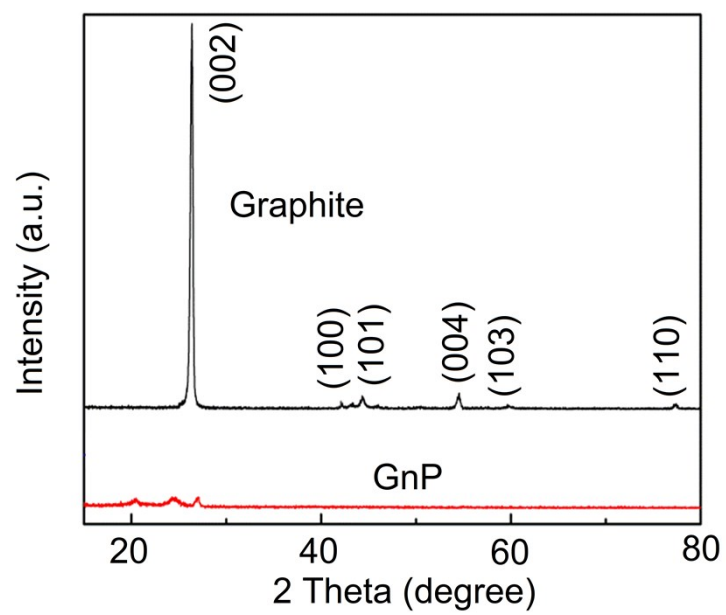


Figure S4. XRD spectra of exfoliated GnP and graphite powder.

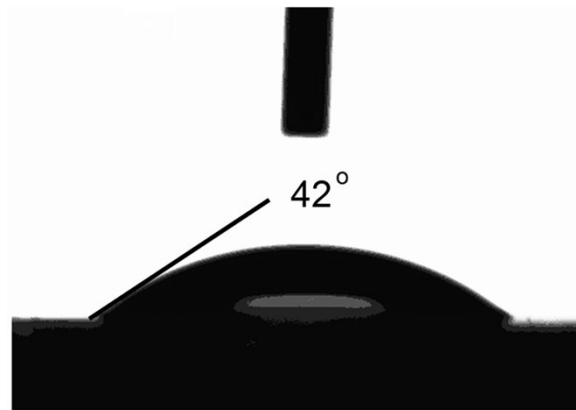


Figure S5. Water contact angle of GnP membrane tested on six different areas.

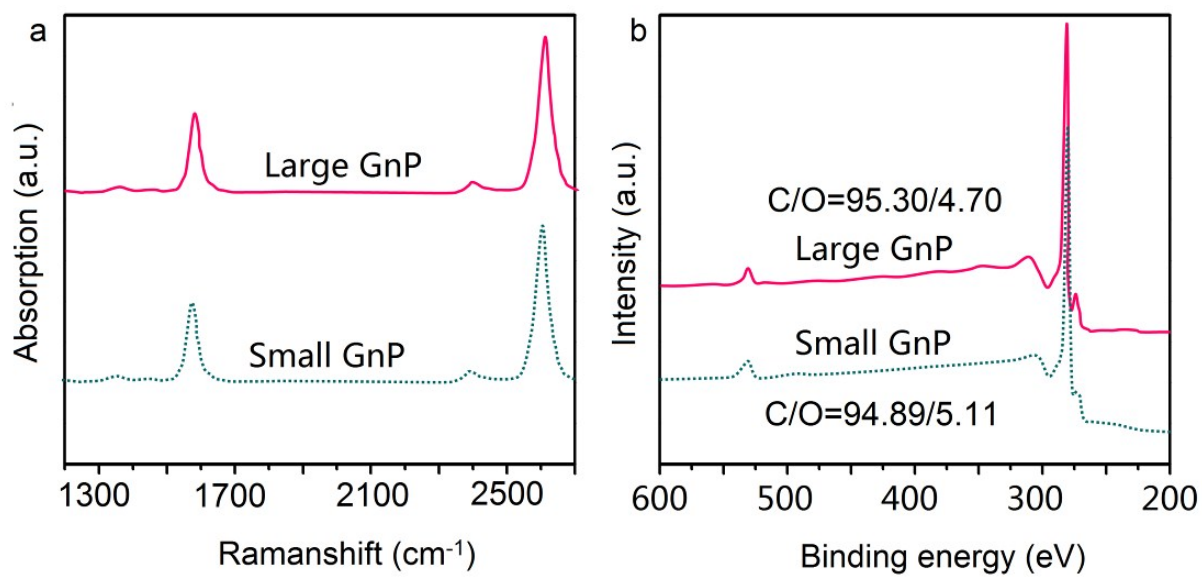


Figure S6. Raman and (a) XPS-C1s spectra (b) of the large and small GnP.

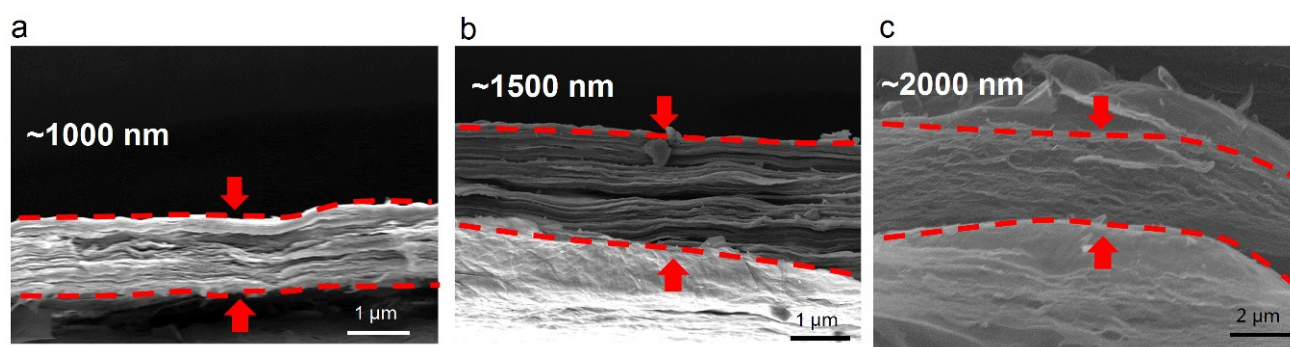


Figure S7. The SEM images of (a) GnP-1, (b) GnP-1.5, and (c) GnP-2 membranes cross-section.

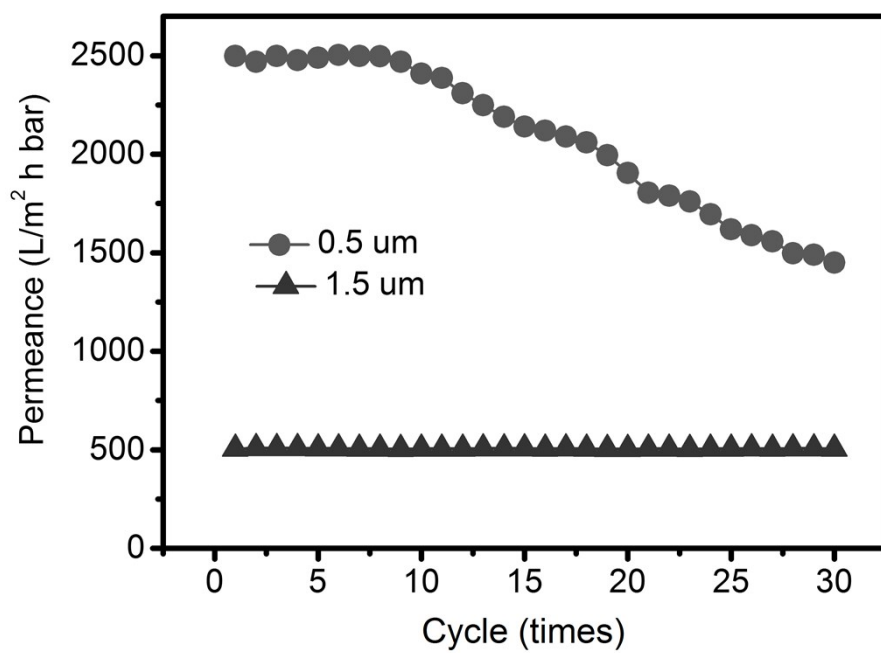


Figure S8. The water permeation performance of the GnP-0.5 and GnP-2 membranes with 30 h periodic operations of water filtration.

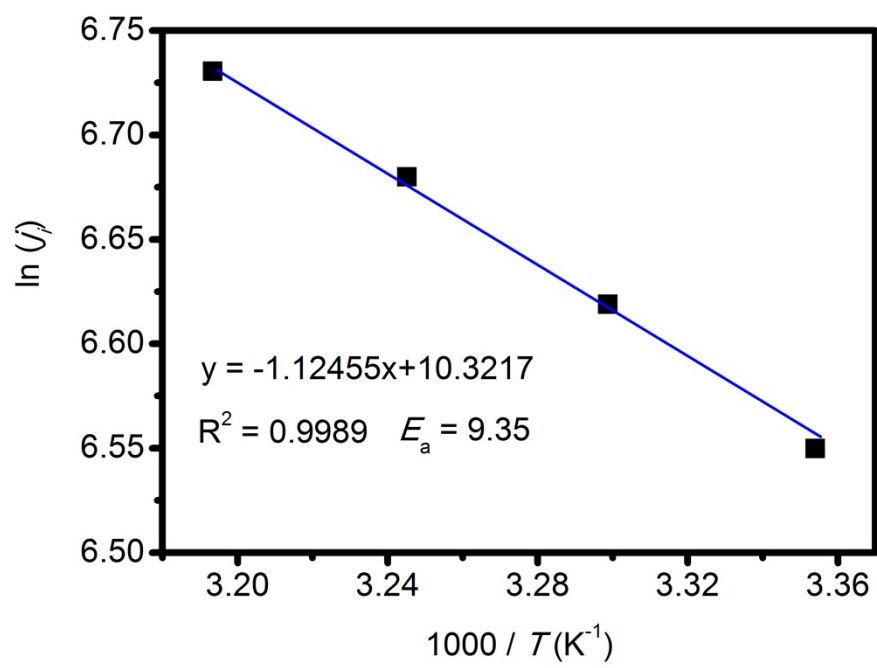


Figure S9. The Arrhenius plot of the water permeation rate versus inverse temperature for GnP-2 membranes.

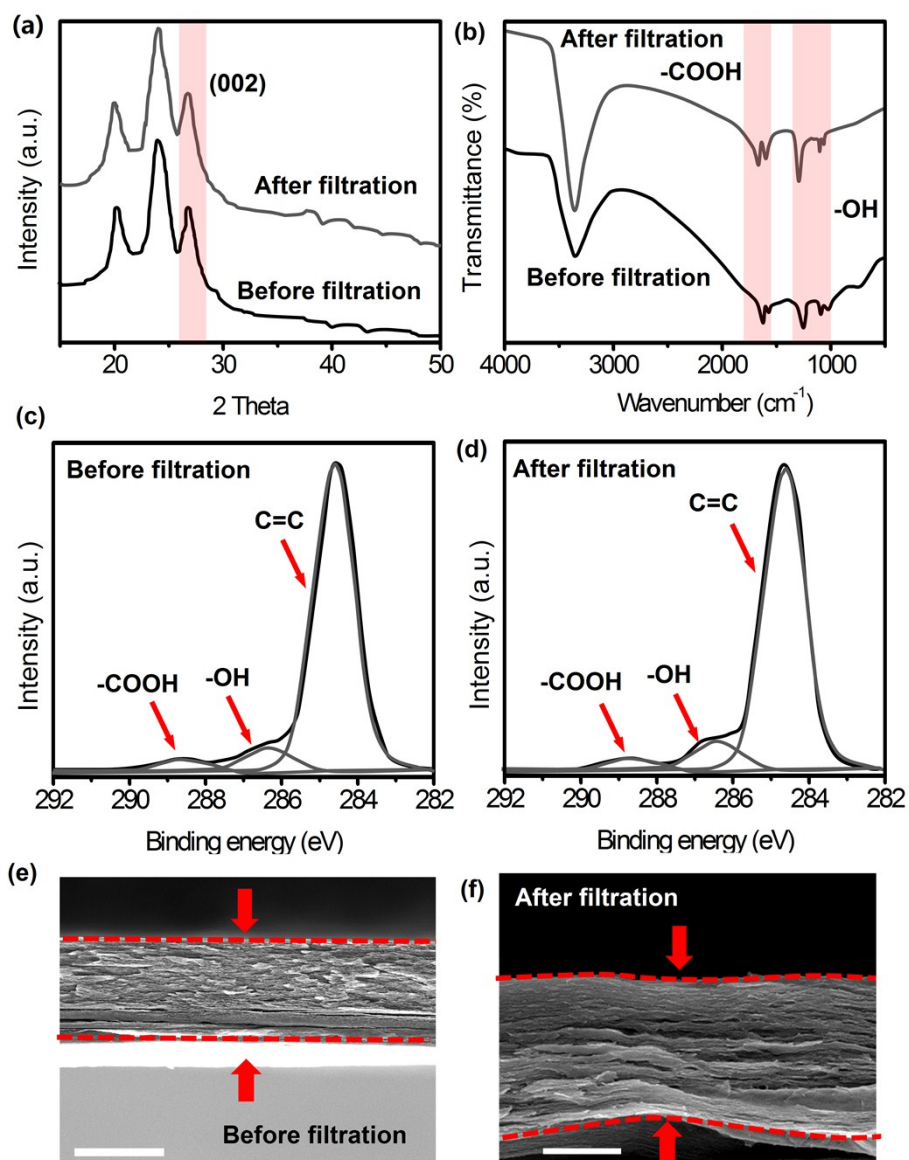


Figure S10. The XRD spectra (a), FTIR spectra (b), XPS spectra (c, d) and the SEM cross-sectional images (e, f) of GnP-2 before and after filtration.

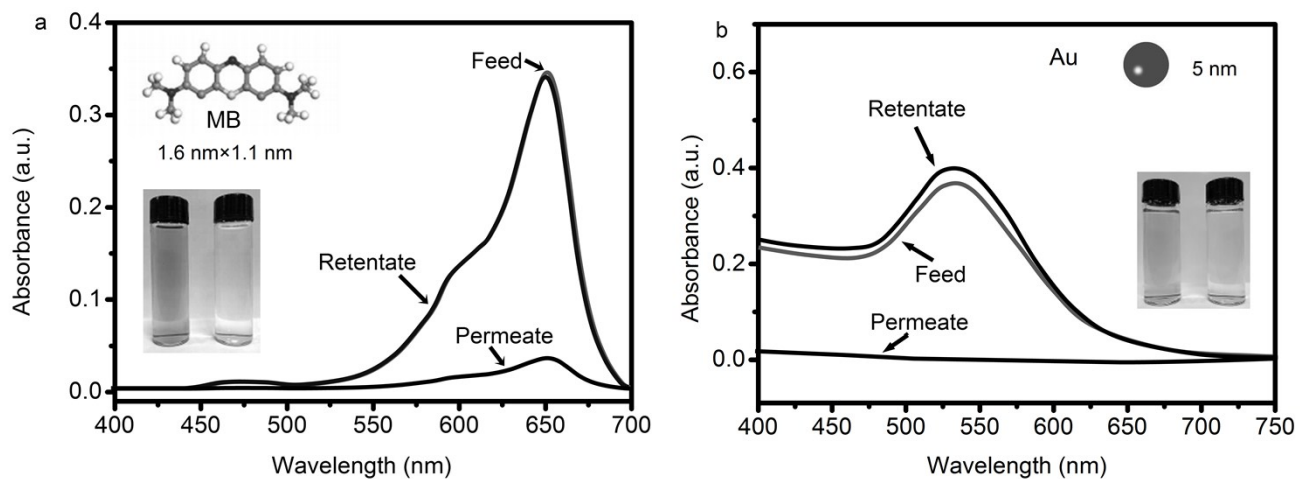


Figure S11. UV-vis absorption spectra of a water solution of MB before and after filtration through a GnP-0.5 membrane; inset shows the photographs of the feed and permeate of the MB solution (a). UV-Vis absorption spectra of an ethanol solution of Au nanoparticles before and after filtration through a GnP-0.5 membrane.

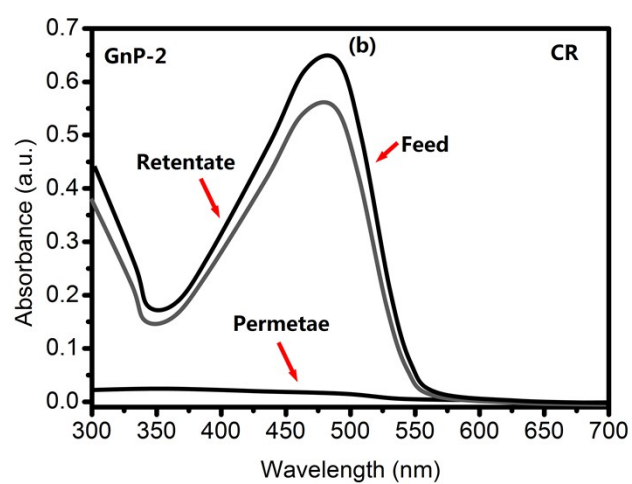
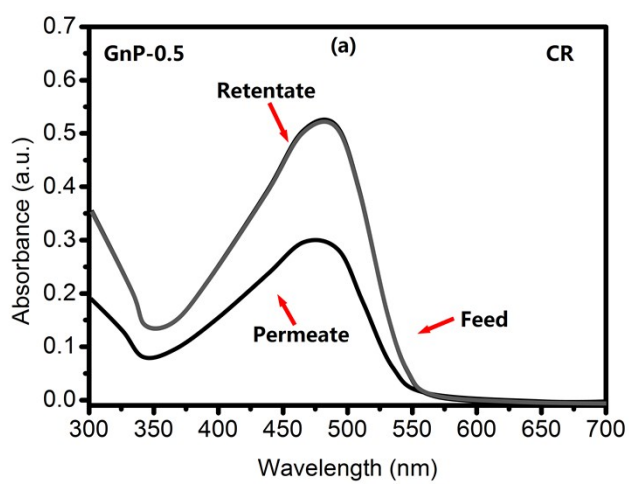


Figure S12. UV-Vis absorption spectra of CR in ethanol before and after filtration through a GnP-0.5 (a) and GnP-2 (b) membranes.

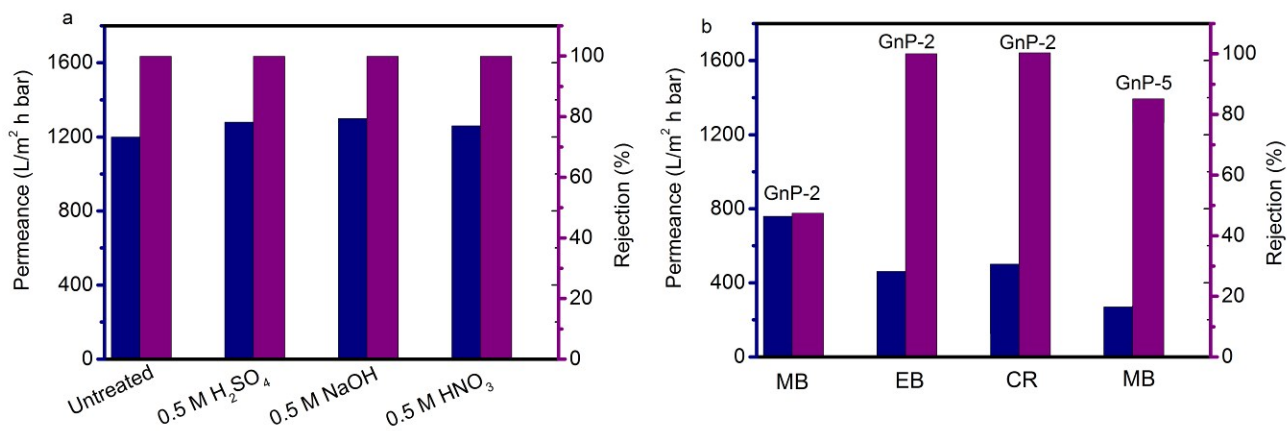


Figure S13. Separation performance versus harsh treatment of the GnP-0.5 membrane for CR in water (a); Separation performance of GnP membranes versus molecular size in methanol solution (b).

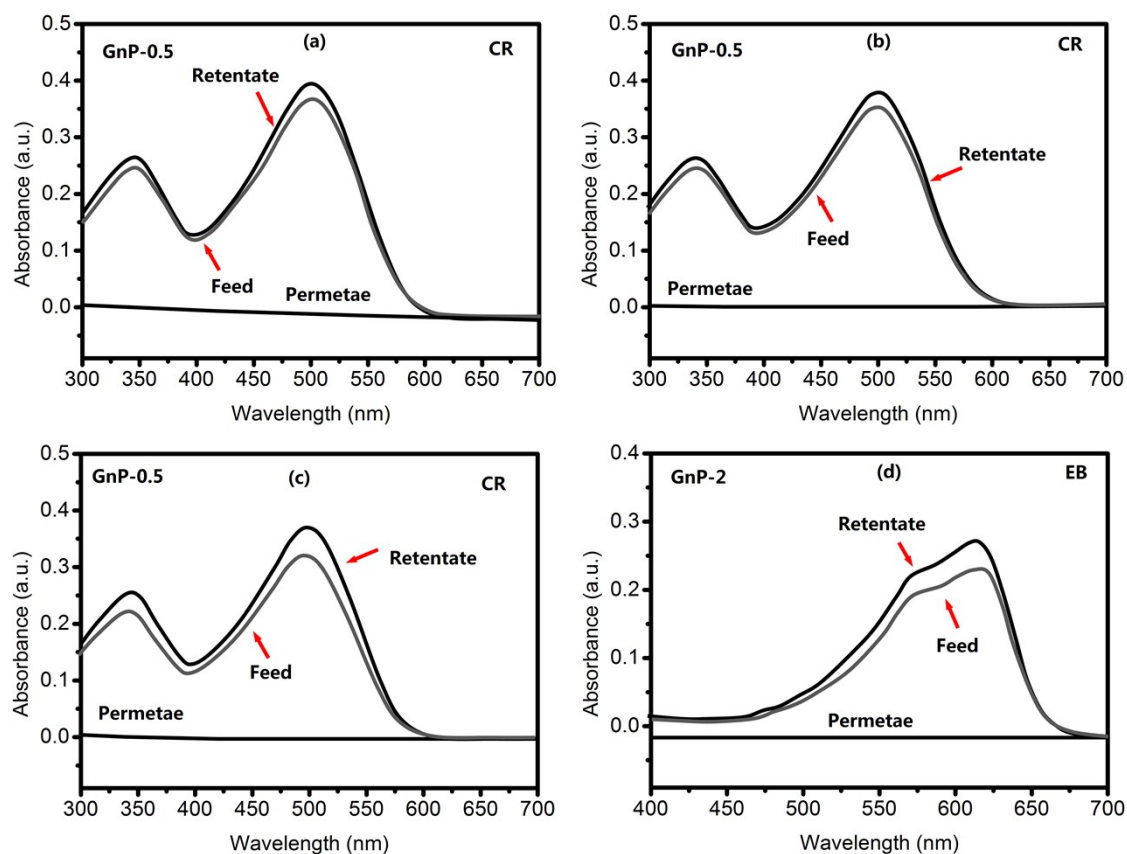


Figure S14. UV-Vis absorption spectra of CR in water before and after filtration through a GnP-0.5 (a) after one month immersion in 0.5 M H_2SO_4 (a), 0.5 M NaOH (b) and 0.5 M HNO_3 (c), respectively. UV-Vis absorption spectra of EB in methanol before and after filtration through a GnP-2 membrane after 30 periodic operations of water filtration.

Table S1. Comparison of the performance of the GnP-0.5 and GnP-2 membranes for the separation of different molecules with different sizes in water.

Dyes	solvents	size / nm ²	GnP-0.5		GnP-2	
			Flux./ L m ⁻² h ⁻¹	Rej./%	Flux./ L m ⁻² h ⁻¹	Rej./%
EB	water	1.2×3.1	900	>99	-	-
CR		2.5×0.7	1200	>99	-	-
MB		1.4×0.6	1450	~42.5	780	~90
CR	ethanol	2.5×0.7	1180	60~	280	>99

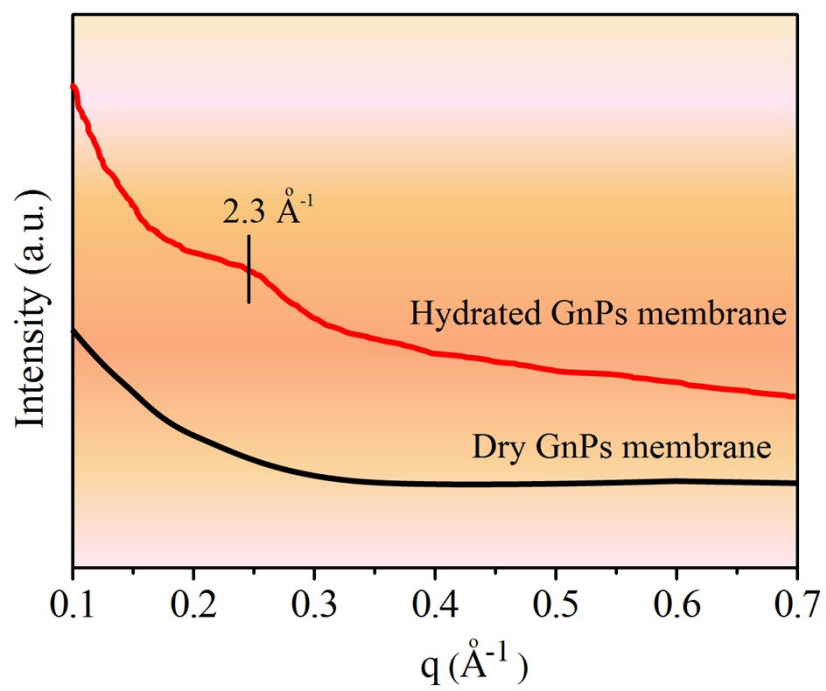


Figure S15. The SAXS curves of the GnPs membranes.