Supporting Information

Improvement of Ultrafiltration for Treatment of Phosphorus-Containing Water by a Lanthanum-Modified Aminated Polyacrylonitrile Membrane

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Table S1. Kinetics model constants

Pseudo-first-order equation			Pseudo-second-order equation			Intraparticle diffusion equation		
q_e (mg/g)	k_1 (h^{-1})	r^2	q_e (mg/g)	k_2 (g/mg.h)	r^2	k_{id} (mg.g^{-1}.h$^{-1/2}$)	α (mg.g^{-1})	r^2
56.55	0.35	0.9931	74.07	5.25E-03	0.9878	26.13	-5.81	0.9942

Table S2. Adsorption Isotherms' constants

pH	Langmuir			Freundlich		
	q_{max} (mg.g^{-1})	K_L (L.mg^{-1})	r^2	K_f (mg.g^{-1})(L.mg^{-1})$^{1/n}$	n	r^2
5	50.00	2.22	0.9985	31.49	10.25	0.2597
7	44.64	0.97	0.9957	26.45	7.24	0.6967

Table S3. Regeneration study of membrane. Volume: 100 ml; contact time: 24 h

Concentration, M (Regenerant)	Temperature (°C)	Recovery of phosphate (%)[b]	Capacity retained (%)[c]
0.01 (NaOH)	rt[a]	3.96±0.20	29.11±1.73
0.1 (NaOH)	rt	6.76±0.26	28.37±5.19
1 (NaOH)	rt	35.62±2.96	47.00±0.47
1 (NaOH)	60	47.48±0.71	-
1 (NaHCO$_3$)	rt	14.06±0.78	35.74±6.44
1 (NaHCO$_3$)	60	28.89±0.80	48.40±2.96
0.1 (NaOH)+ 1 (NaHCO$_3$)	60	45.15±0.82	64.74±3.31
2 (NaHCO$_3$)	60	67.55±1.57	87.23±5.55
0.1 (NaOH)+ 2 (NaHCO$_3$)	60	66.44±5.57	83.81±7.88

[a]room temperature

[b]amount of phosphate detected in regenerant solution over amount of phosphate adsorbed

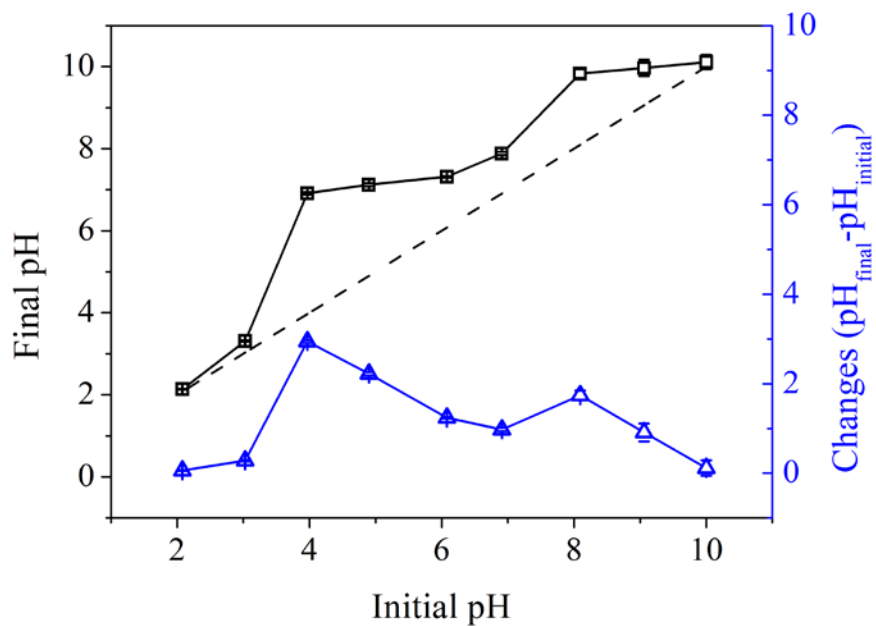[a]adsorption capacity of phosphate in second cycle over that in first cycle

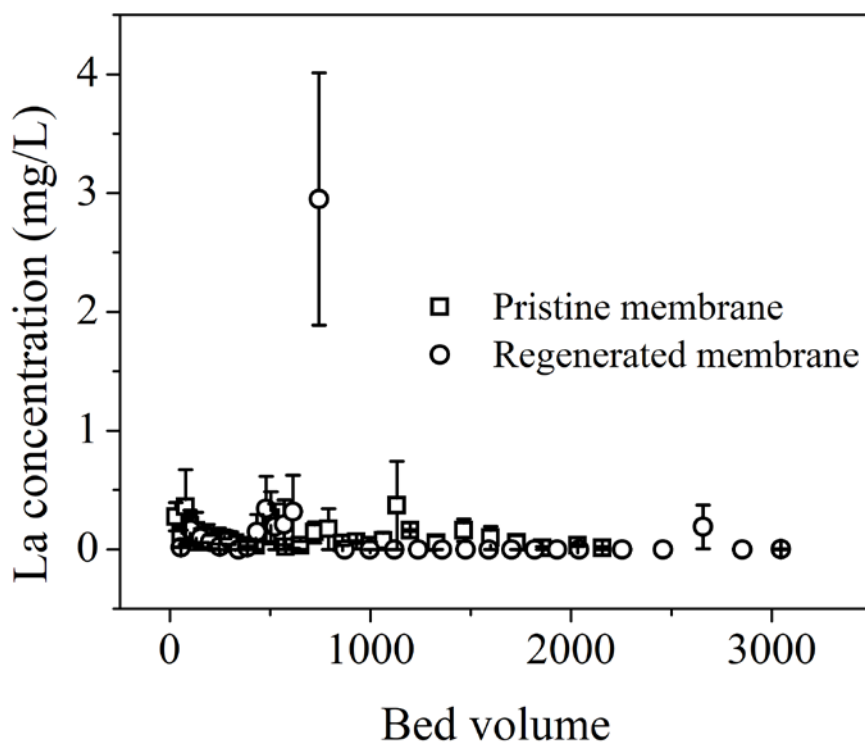**Figure S1.** Changes of pH after adsorption

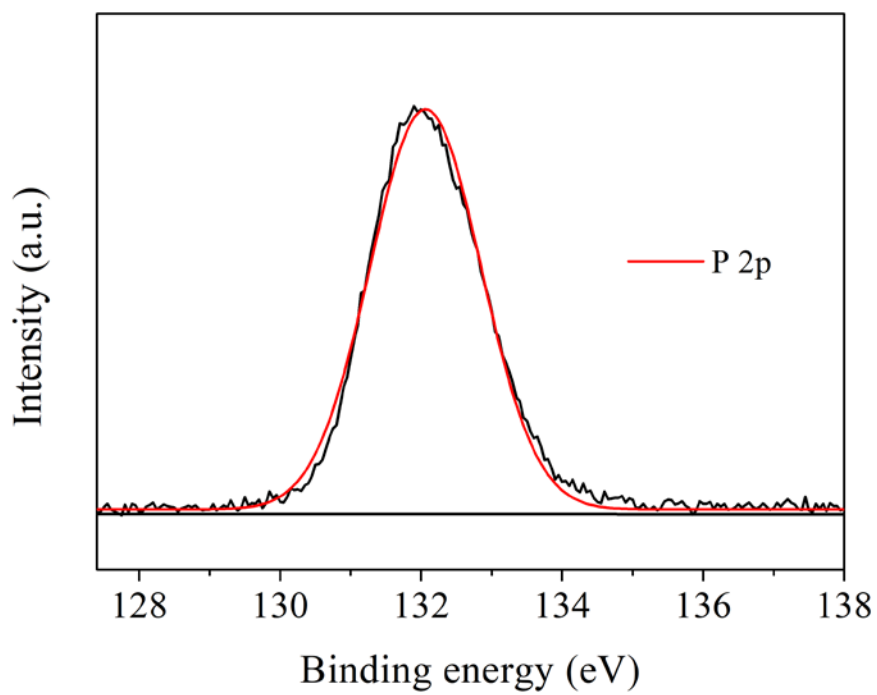**Figure S2.** La leakage during filtration study

Figure S3. High resolution P 2p spectrum of PAN-NH2-La0.3 membrane after adsorption