Supporting Materials

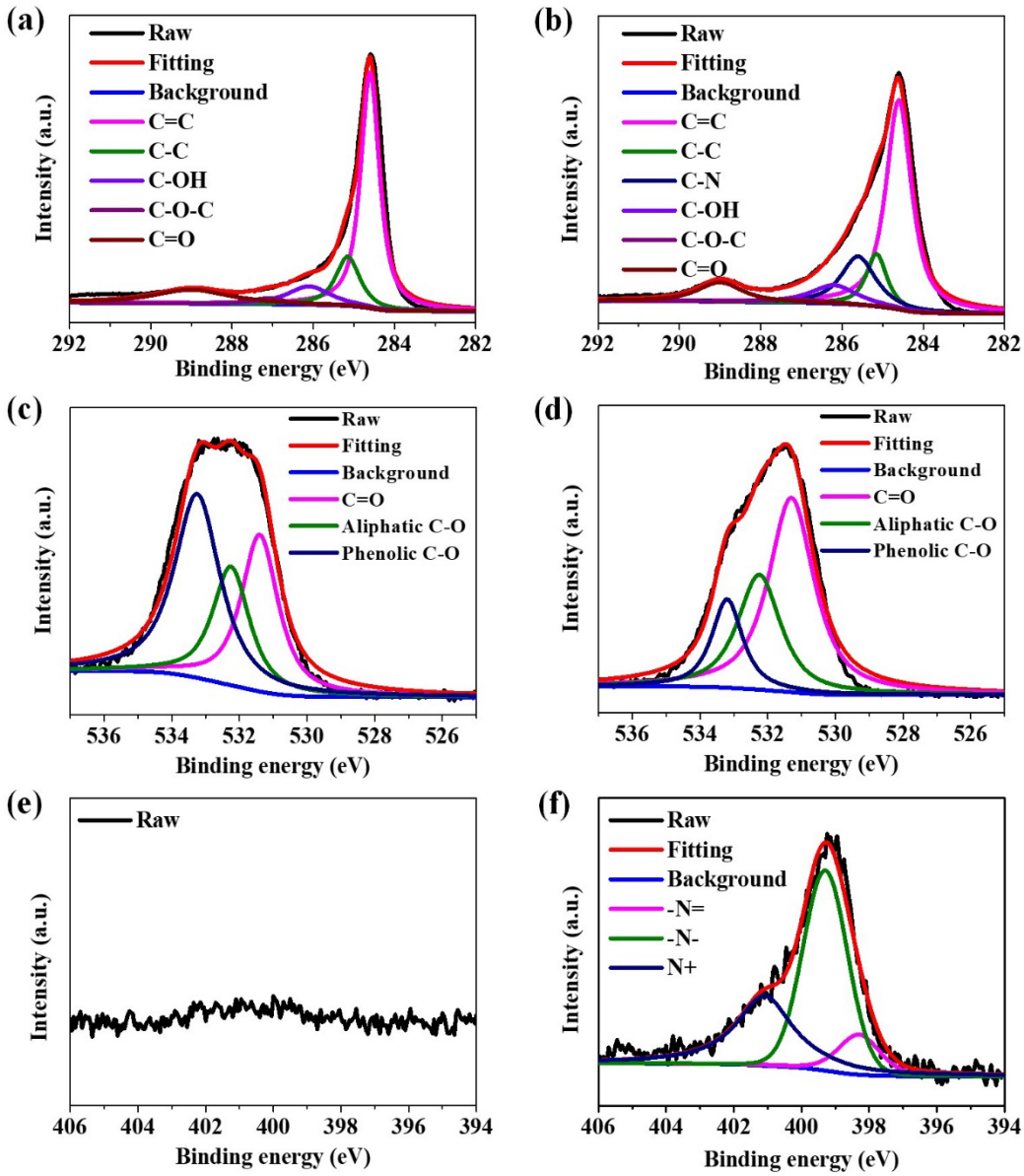

Fig. S1 Deconvoluted XPS C 1s, O 1s and N 1s spectra of CNT and CPANi/CNT membranes. (a) XPS C 1s spectra of CNT membrane; (b) XPS C 1s spectra of CPANi/CNT membrane; (c) XPS O 1s spectra of CNT membrane; (d) XPS O 1s spectra of CPANi/CNT membrane; (e) XPS N 1s spectra of CNT membrane; (f) XPS N 1s spectra of CPANi/CNT membrane.

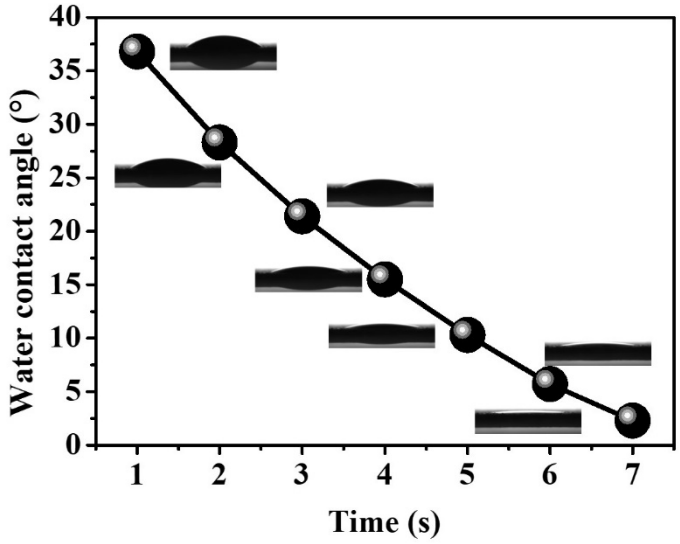

Fig. S2 Time variation of water contact angle of the CPANi/CNT membrane.

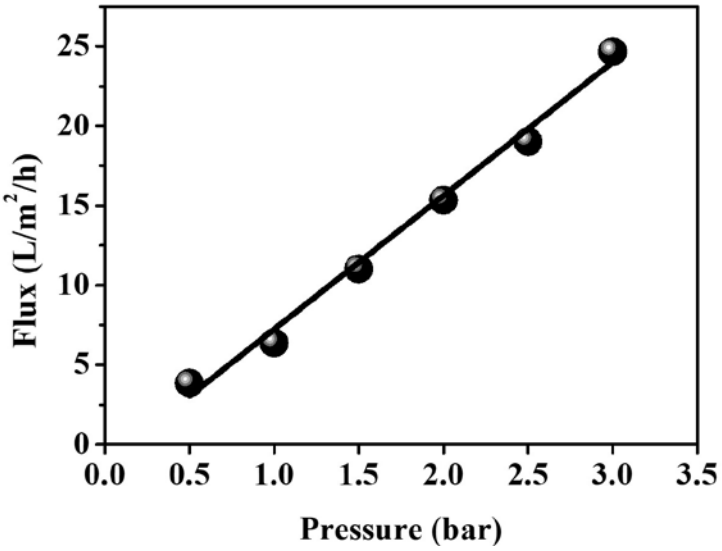

Fig. S3 Water flux versus pressure applied on the CPANi/CNT membrane with ANi concentration of 0.20 mol/L.

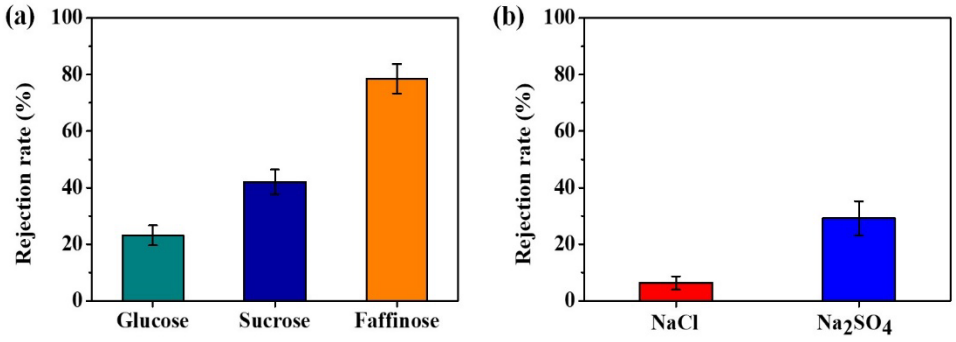

Fig. S4 (a) Rejection rates of CPANi/CNT NF membrane for glucose, sucrose and raffinose. (b) Na_2SO_4 and NaCl rejection rates of the membrane. The sugars with the concentration of 200 mg/L and the salts with the concentration of 10 mmol/L were employed for the rejection performance tests.

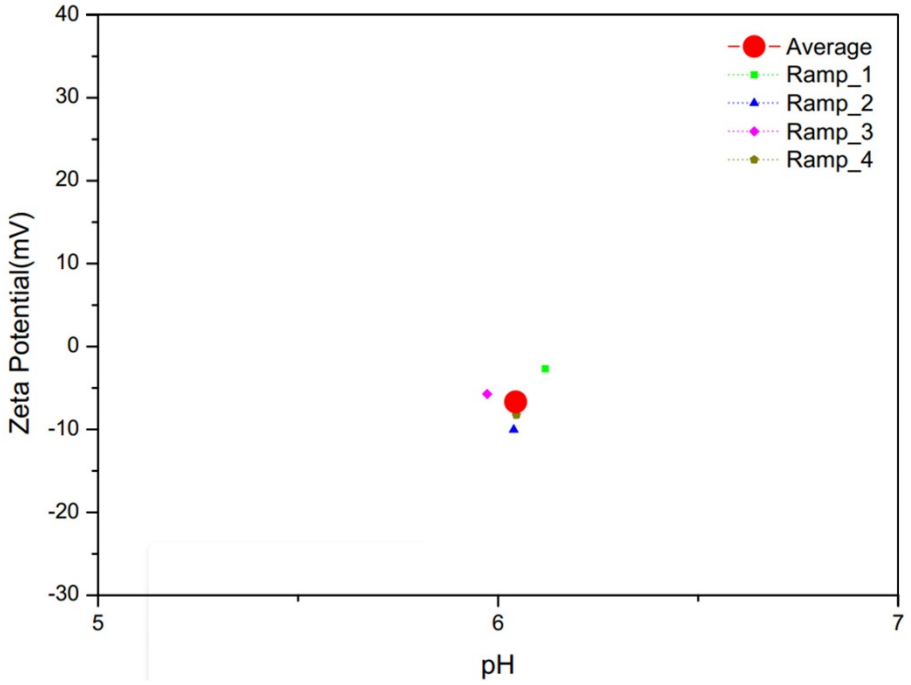

Fig. S5 Zeta potential of the CPANi/CNT NF membrane. The Zeta potential was measured in a Na_2SO_4 solution with the concentration of 10 mmol/L and the pH of 7.0.

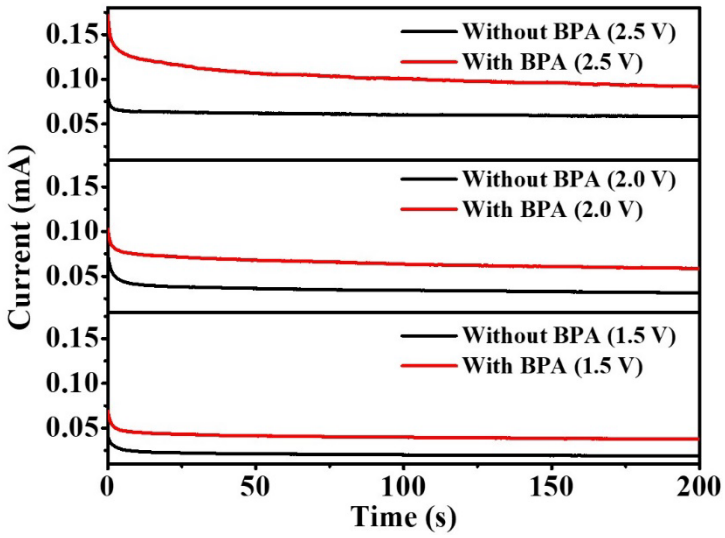

Fig. S6 *I-t* curves of the membrane (at 1.5, 2.0 and 2.5 V) in the absence and presence of BPA. The electrolyte was 10 mmol/L Na_2SO_4 solution. The test time was 200 s.

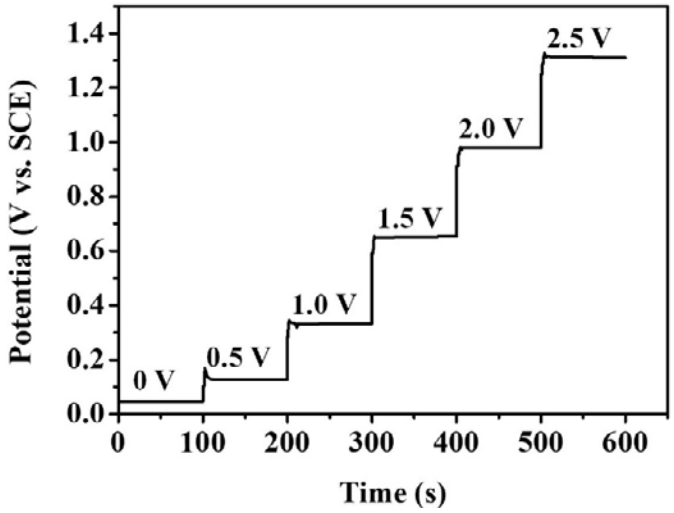

Fig. S7 Membrane anode potentials (V, vs. SCE) under different voltages. A CPANi/CNT membrane was served as the anode and a titanium mesh was used as the cathode. The voltages were applied by a DC stabilized power supply. The electrolyte was 10 mmol/L Na_2SO_4 solution. The test time at each voltage was 100 s.

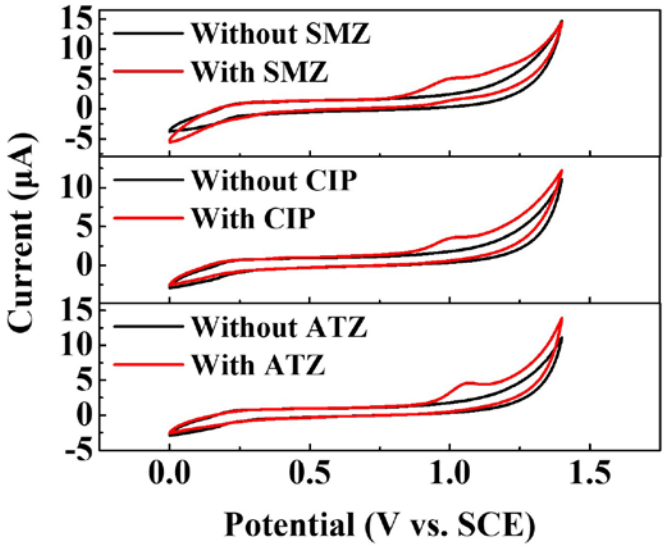

Fig. S8 CV curves of the membrane in the absence and presence of SMZ, CIP and ATZ.

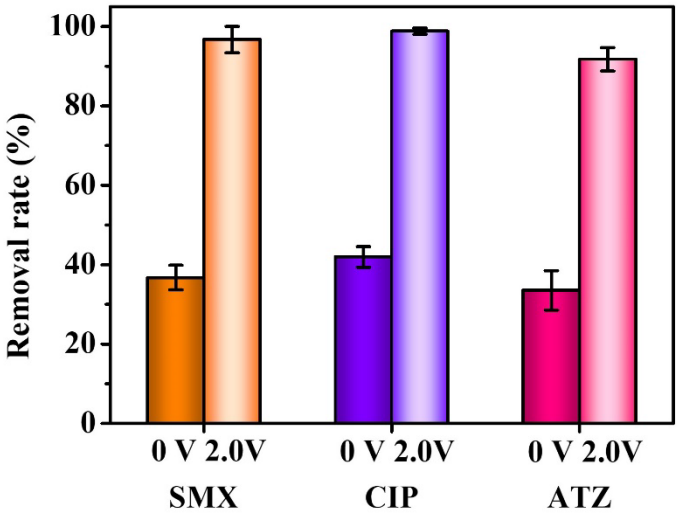

Fig. S9 SMZ, CIP and ATZ removal rates of the membrane at the voltages of 0 and 2.0 V (C_{feed}: 5 mg/L, operation pressure: 2.0 bar).

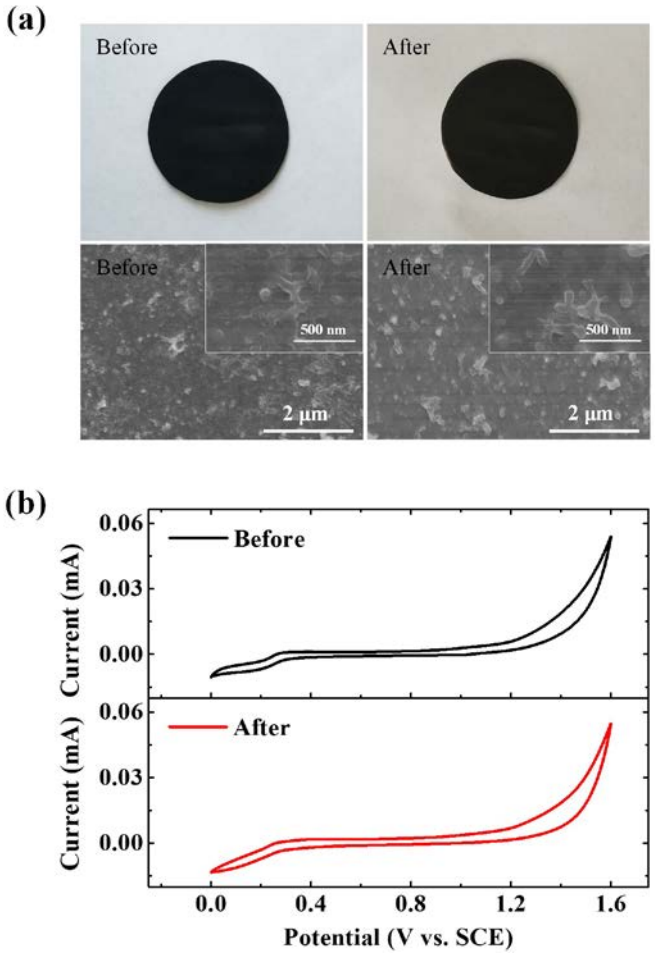

Fig. S10 (a) Photographic images and SEM images of CPANi/CNT membrane before and after operation at 2.0 V for 30 h (feed solution: 10 mmol/L Na_2SO_4 solution, operation pressure: 2.0 bar). (b) CV scans of CPANi/CNT membrane before and after operation at 2.0 V for 30 h. (10 mmol/L Na_2SO_4 solution, scaning rate: 50 mV/s, scanning range: 0–1.6 V vs. SCE).

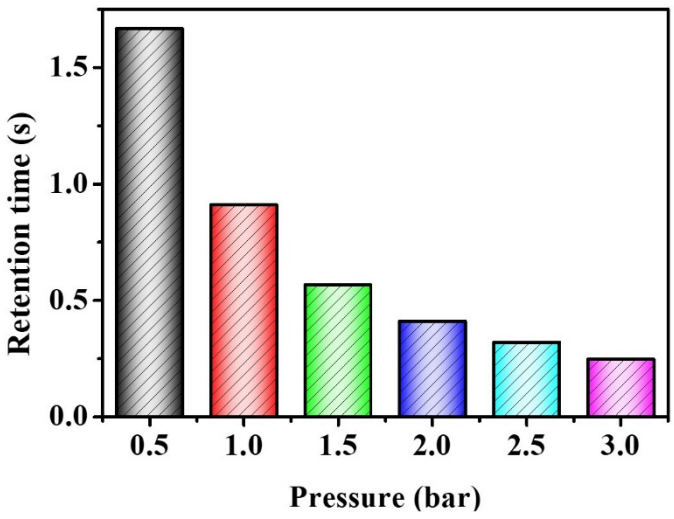

Fig. S11 Retention times of BPA in membrane filtration process under different transmembrane pressures.

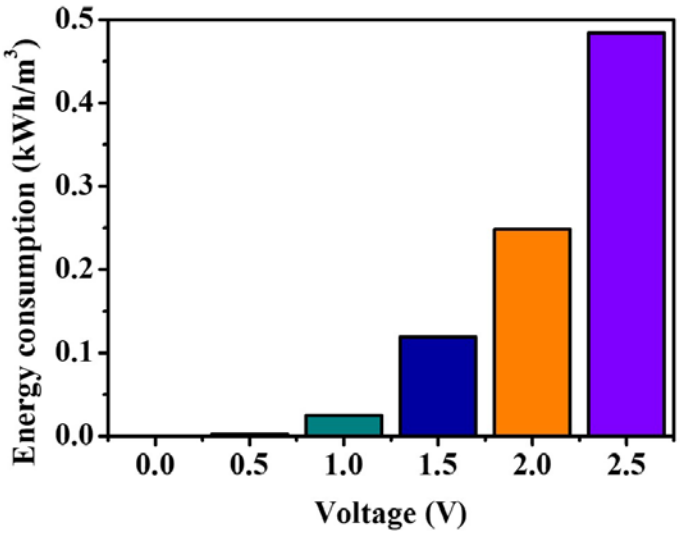

Fig. S12 Energy consumptions caused by different external voltages for electro-assisted CPANi/CNT membrane filtrations.

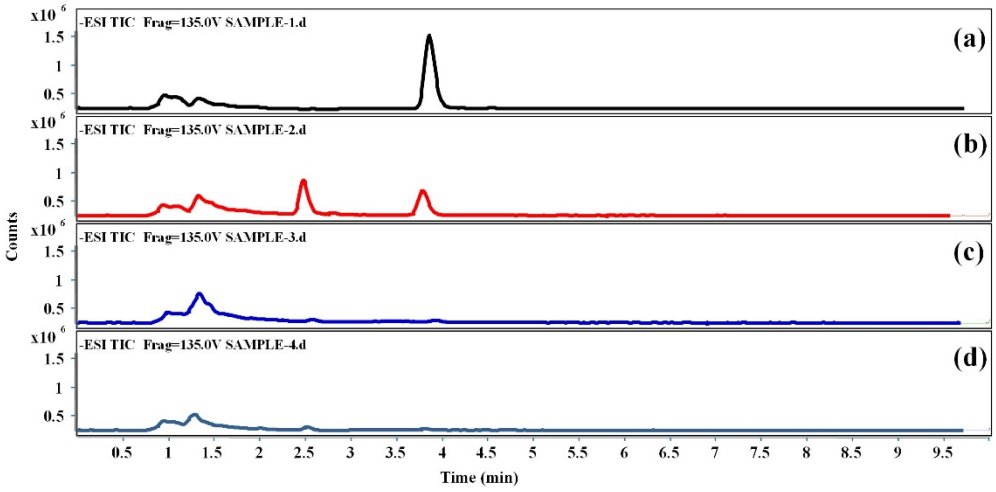

Fig. S13 Ion chromatograms of (a) the BPA feed solution and the permeate solutions at (b) 1.5 V, (c) 2.0 V and (d) 2.5 V.

Table S1 BPA removal performances of the CPANi/CNT NF membrane and some reported NF membranes in the literature.

Membrane	Pressure (bar)	Water permeance ($L/m^2/h/bar$)	BPA concentration (mg/L)	Rejection rate (%)	Reference
PES/FePB 0.5% (Y4)	5	3.28	5	69.5	Elakkiya et al., 2021
NF 270	10	14.86	50	~80	Yüksel et al., 2013
NF 90	10	6.05	50	⩾98	Yüksel et al., 2013
PES-PEGHBS hollow fiber	6	11.08	10	90	Bolong et al., 2010
NF Desal 5 DK	20	3.2	0.01	50	Zhang et al., 2006
PA/TiO_2 TFC	5	1.052	100	99	Anan et al., 2019
PSf	5	4.98	100	19	Anan et al., 2019
MOF-TFN (MOF0.20)	5	39.5	0.2	79.8	Dai et al., 2019
biocatalytic PDA/PEI	1.5	3.3	10	97	Li et al., 2018
CPANi/CNT	2	6.8	5	36.8	This work
CPANi/CNT with 2.0 V	2	6.8	5	98.1	This work
CPANi/CNT with 2.0 V	2	4.4	0.1 (with HA)	100	This work

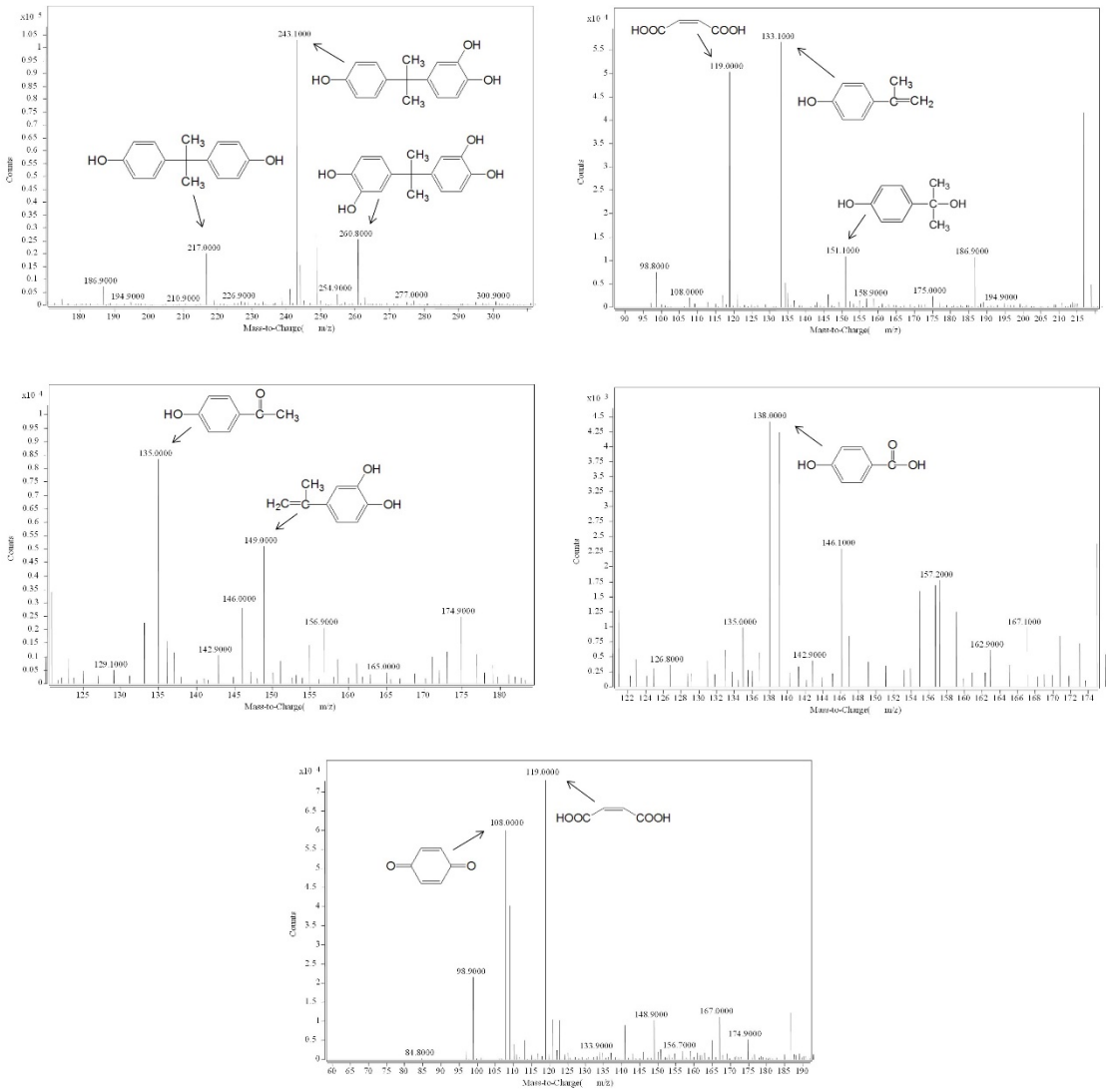

Fig. S14 The main LC-MS identification of BPA oxidation products.

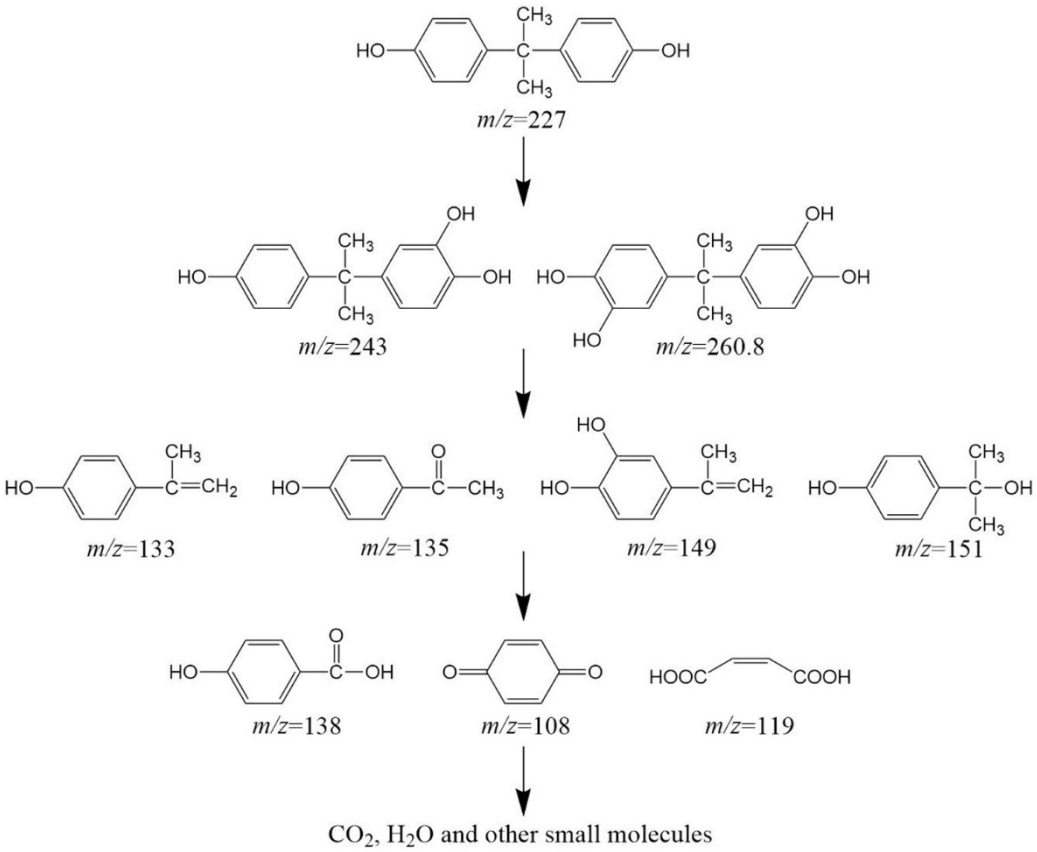

Fig. S15 Possible oxidation pathways of BPA in CPANi/CNT membrane.

References

Anan N S M, Jaafar J, Othman M H D, Rahman M A, Aziz F, Shahrodin N S M (2019). Titanium dioxide incorporated thin film composite membrane for bisphenol A removal. Malaysian Journal of Fundamental and Applied Sciences, 15(5): 755–760

Bolong N, Ismail A F, Salim M R, Rana D, Matsuura T, Tabe-Mohammadi A (2010). Negatively charged polyethersulfone hollow fiber nanofiltration membrane for the removal of bisphenol A from wastewater. Separation and Purification Technology, 73(2): 92–99

Dai R, Guo H, Tang C Y, Chen M, Li J, Wang Z (2019). Hydrophilic selective nanochannels created by metal organic frameworks in nanofiltration membranes enhance rejection of hydrophobic endocrine-disrupting compounds. Environmental Science & Technology, 53(23): 13776–13783

Elakkiya S, Arthanareeswaran G, Das D B (2021). Embedding low–cost 1D and 2D iron pillared nanoclay to enhance the stability of polyethersulfone membranes for the removal of bisphenol A from water. Separation and Purification Technology, 266: 118560

Li S, Luo J, Wan Y (2018). Regenerable biocatalytic nanofiltration membrane for aquatic micropollutants removal. Journal of Membrane Science, 549: 120–128

Yüksel S, Kabay N, Yüksel M (2013). Removal of bisphenol A (BPA) from water by various nanofiltration (NF) and reverse osmosis (RO) membranes. Journal of Hazardous Materials, 263(Pt 2): 307–310

Zhang Y, Causserand C, Aimar P, Cravedi J P (2006). Removal of bisphenol A by a nanofiltration membrane in view of drinking water production. Water Research, 40(20): 3793–3799