

## Supporting Information

### Toughened chitosan-based composite membranes with antibiofouling and antibacterial properties via incorporation of benzalkonium chloride

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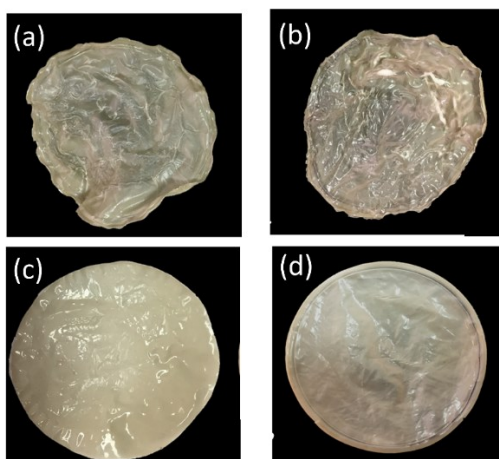
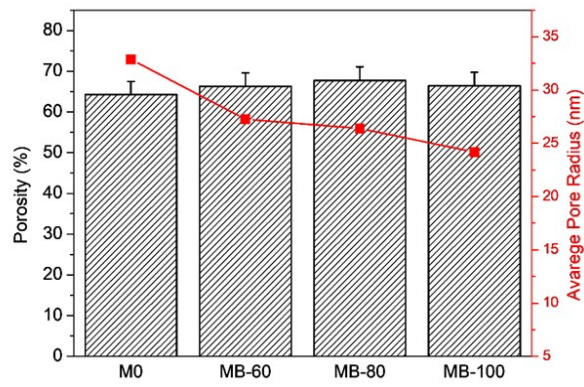
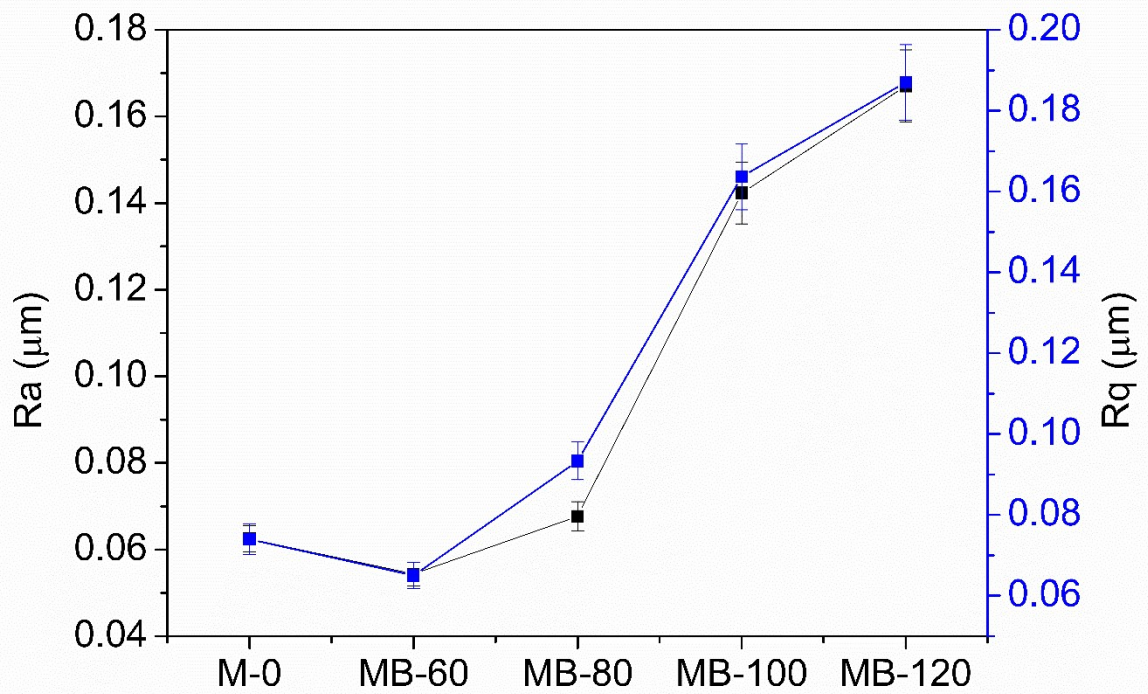


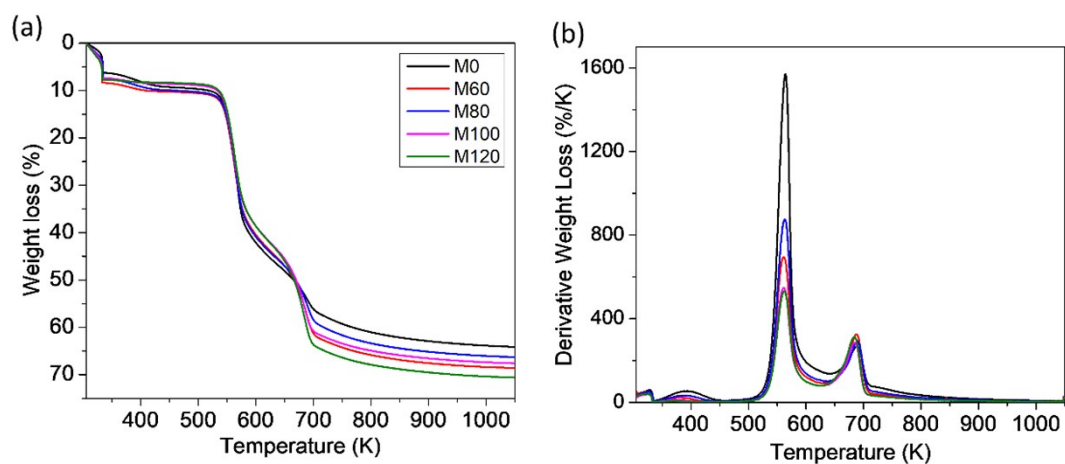
Fig. S1. Physical appearances of dried membranes of (a) M-0 and (b) MB-120; wet membranes of (c) M-0 and (d) MB-120



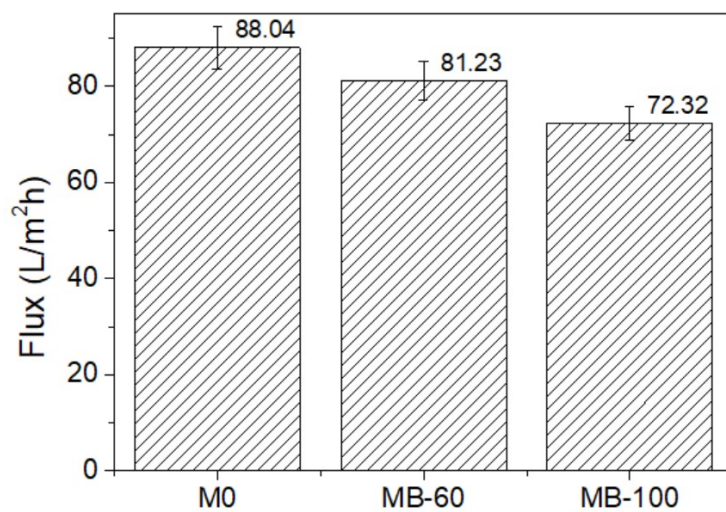
**Fig. S2.** Porosity and average pore radius of chitosan/PEG/MWCNT/BKC



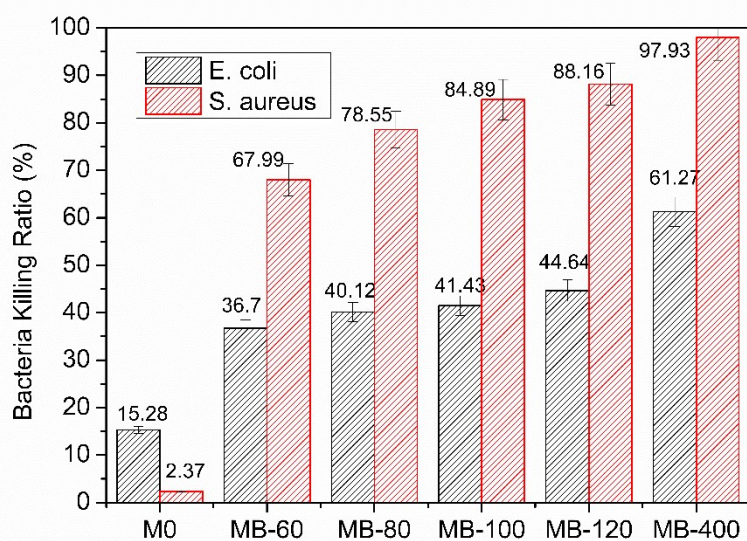
**Fig. S3.** The Ra and Rq values of composite membranes containing different BKC contents.



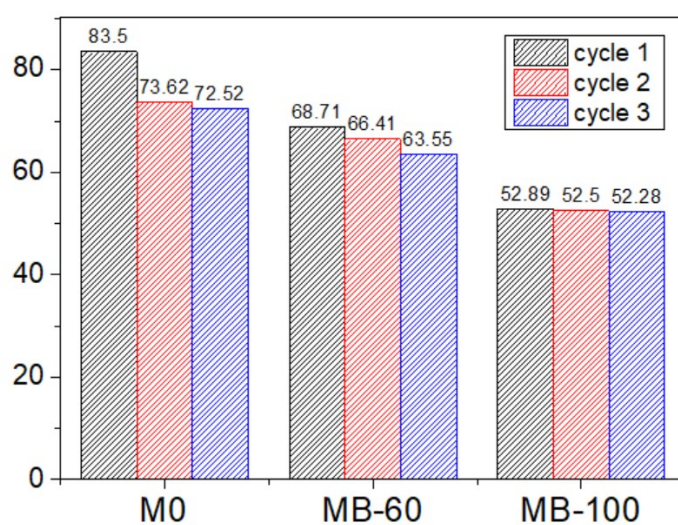
**Fig. S4.** Thermal stability of composite membranes (a) and derivative weight loss from thermogravimetric analysis (b)



**Fig. S5.** Average water flux of the composite membranes containing different BKC contents after a year of storage.



**Fig. S6.** The bacteria-killing ratio of the composite membranes containing different BKC contents after a year of storage.



**Fig. S7.** Average water flux of the composite membranes containing different BKC contents for up to 3 cycles of operation.

**Table S1.** Thermal stability of composite membranes

Composite membrane	Parameter				
	Weight loss (%)			Maximum decomposition temperature (K)	Final residual (%)
	Phase 1	Phase 2	Phase 3		

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<b>M0</b>	10.3	45.7	8.1	564	35.9
<b>MB-60</b>	11.2	50.8	6.6	561	31.4
<b>MB-80</b>	11	47.6	7.7	563	33.7
<b>MB-100</b>	9.5	51.5	6.6	561	32.4
<b>MB-120</b>	9.2	54.5	6.9	561	29.4

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