Powdered activated carbon exacerbates fouling in MBR treating olive mill wastewater

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Supplementary Information to the Research Paper

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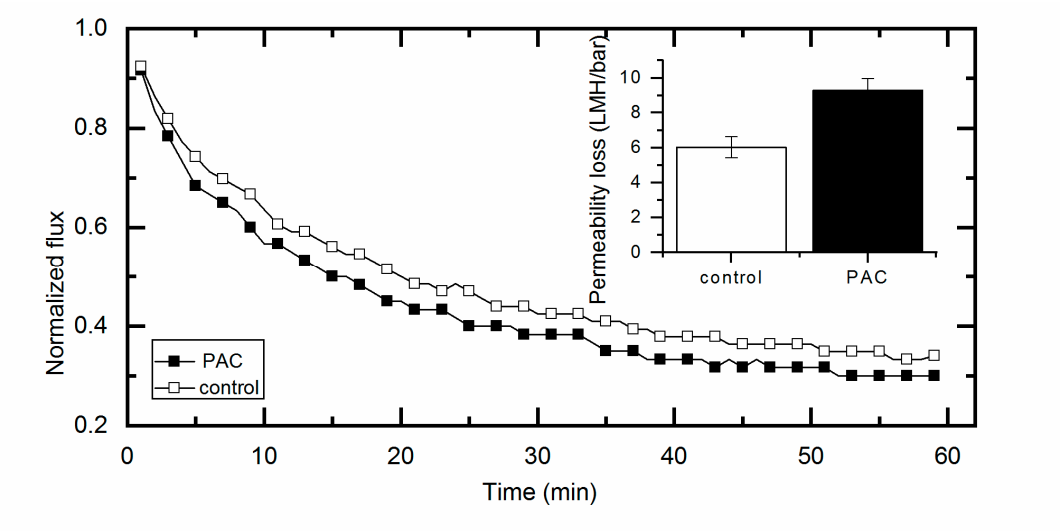


Figure S1. Flux decline during fouling with SMP (50 ± 3 mg/L TOC dissolved in DI water) and corresponding irreversible permeability loss after 60 minutes filtration of SMP solution originated from the two MBR with and without PAC.

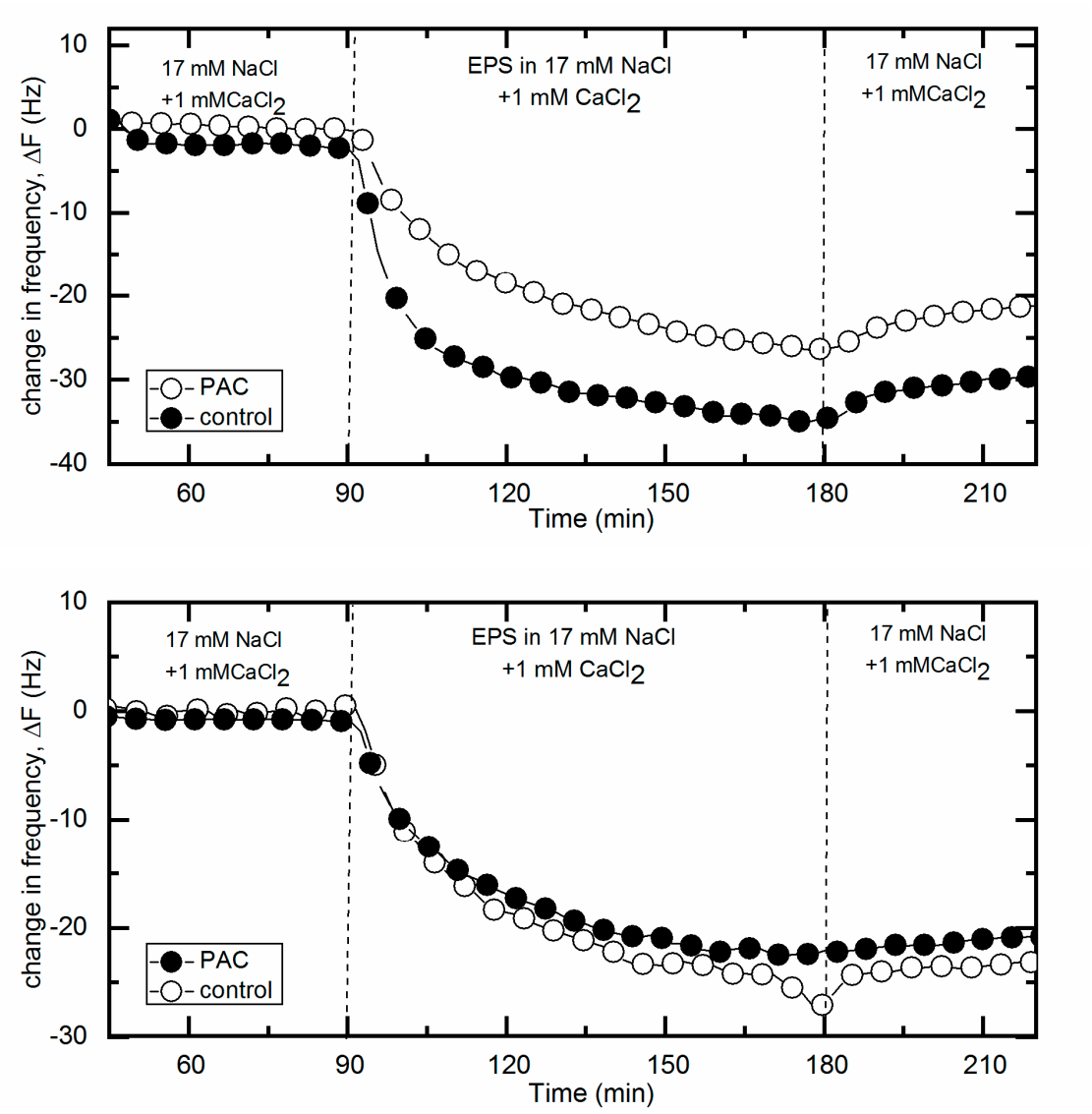
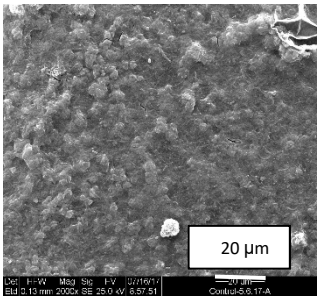
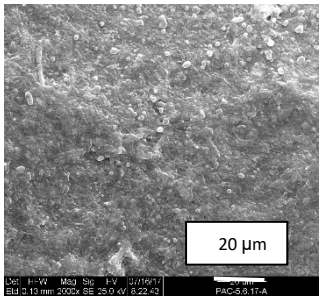
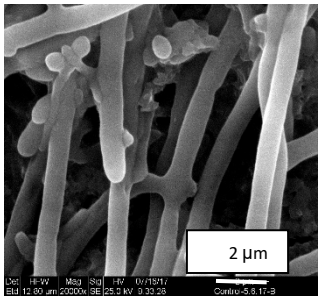


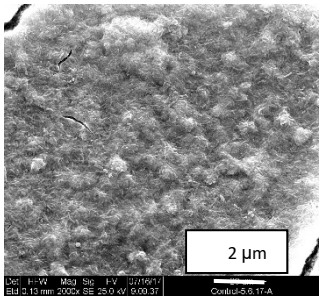
Figure S2. The effect of PAC addition to the MBRs on the adherence properties of the EPS: QCM-D adhesion profiles of the EPS provided as frequency shifts during EPS adhesion to PES-coated sensors at the ninth overtone and a flow rate of 100 µl/min of the EPS solution. A background solution with an ionic strength of 20 mM (17 mM NaCl ± 1 mM $CaCl_2$) was supplemented with EPS (20 mg/l as DOC) extracted from the MLSS of the two runs (top and bottom panels correspond to panels a & b in Figure 3 of the original paper).

Without PAC:

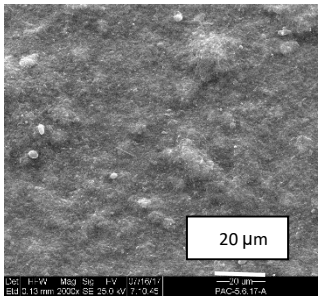


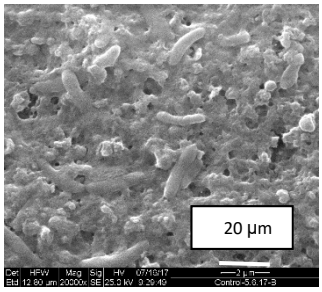


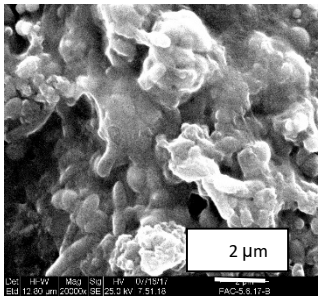




With PAC:







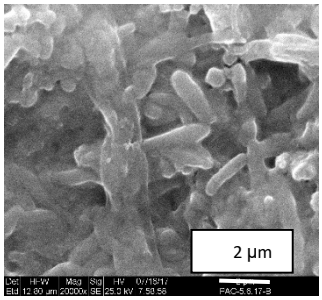


Figure S3. SEM images of the biofilm layers developed on membranes taken from the two MBR systems, with and without PAC.

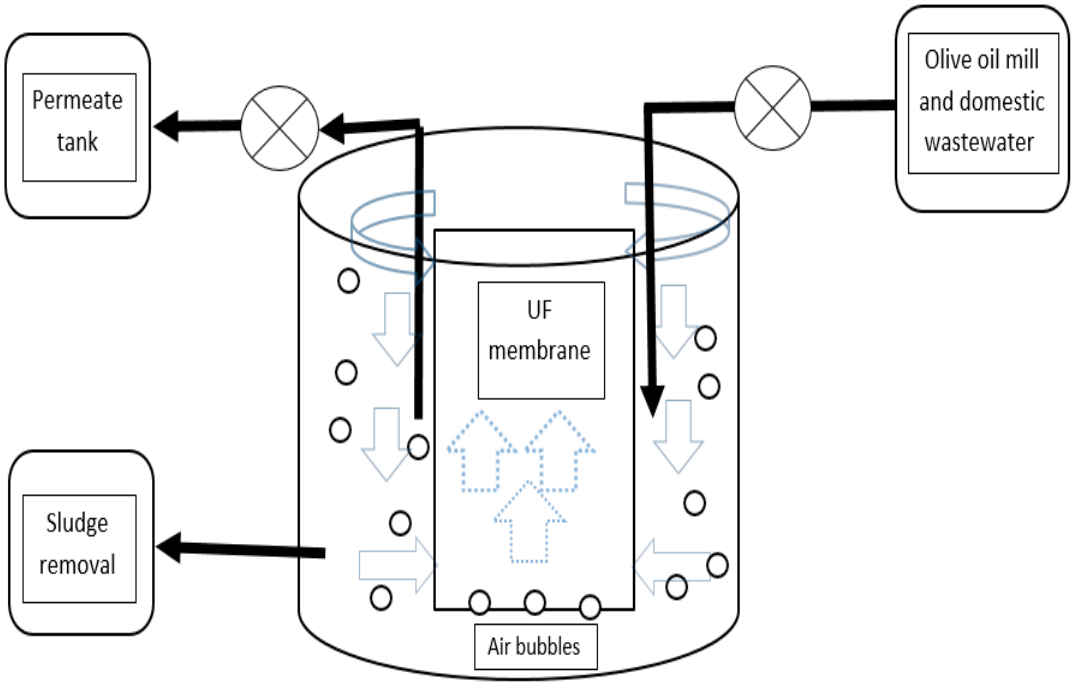


Figure S4. Schematic diagram of the MBR.

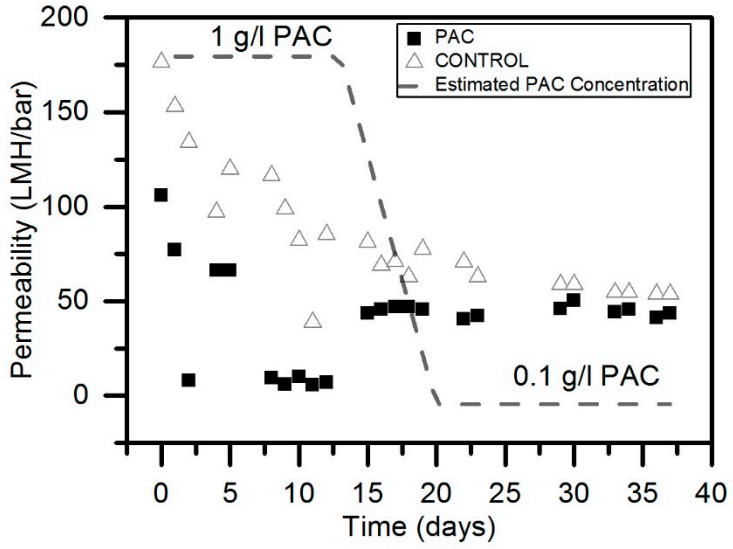


Figure S5. Permeability of the membranes in MBR-PAC and the control (w/o PAC) during the preliminary experiment. A rapid decline in the permeability of the membrane in the PAC reactor was observed versus slower decline in membrane permeability in the control reactor. Therefore, a gradual reduction in PAC concentration was performed. Once the PAC concentration in the reactor had reached the final concentration of 0.1 g/l, the permeability was close in the two reactors.