Real-time fouling monitoring in membrane filtration systems

Impact
Fouling is considered the bottleneck of membrane filtration systems. Fouling characterization is performed destructively *ex-situ* (i.e. membrane autopsy). An innovative approach employing interferometric technique was developed to monitor the fouling development *in-situ* under continuous operation.

The cake layer developed in an activated sludge membrane bioreactor was monitored continuously under continuous operation despite the high turbidity and the high concentration of mixed liquor suspended solids.

Results
The proposed approach enables to visualize and quantify the fouling developed on the system under continuous operation. The approach was successfully employed to monitor the fouling in: wastewater treatment (MBR), desalination (RO) and brine treatment (MD). The data generated allowed to correlate the impact of the foulants on the flux decrease and pressure drop increase.

In membrane distillation for the treatment of highly saline feeds, the approach was employed to monitor the formation of different foulants on the membrane surface over the time.

Conclusion
The systems were monitored in-situ non-destructively under continuous operation. The approach enabled correlated the effect of fouling on the process performance decrease.

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