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Limited swelling of deposit (gel) layer obtained in crossflow filtration of casein micelles dispersion



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THIS POSTER SERVES TO UNDERLINE THE FOLLOWING:

• characterization of membrane fouling is essential

SOME ILLUSTRATIONS OF OUR WORK ON FOULING ANALYSIS



for understanding of filtration mechanism;

- membrane fouling is sensitive to all operating conditions, including that applied during the fouling formation (filtration), fouling removal (rinsing), and fouling analysis;
- as well as the fouling formation, the fouling removal is not immediate; this must be accounted during the fouling analysis;
- all experiment conditions should be described properly (e.g. no such thing as "simple rinsing")

Fouling







Actual photo of experiment (filter cell and SAXS chamber).

• Concentration polarization and gel layers are "scanned" through the window by narrow X-ray beam, and scattering patterns are



• evolution of fouling during the fouling analysis can reveal interactions in the fouling layer.

These statements originate from our work on the fouling (gel layer) analysis in the ultrafiltration of soft colloidal particles (casein micelles dispersions).

Our results were presented in next articles:

[1] Loginov et al. J. Membr. Sci. 595 (2020) 117498

registered.



Side view of the filter cell and scattering patterns (SAXS patterns) obtained for different distances from the membrane surface.

• Patterns are analyzed and local casein concentrations are obtained for different distances from the membrane surface *z*; i.e. gel concentration profile is obtained: each § 100 distance $z \rightarrow$ one SAXS pattern \rightarrow \rightarrow one local gel concentration. Ca



• Concentration profile is recalculated into the local Filtration 1 (10¹⁶ s²·m⁻⁴) compressibility-permeability function (here $kd\Pi/dc$) that is an integral characteristic $kd\Pi/dc$) of a filtered material (here 0.2 casein micelles); it describes filtration, compression, swelling, etc. It can be studied for different fouling conditions or different stages of experiment (e.g. formation vs fouling removal, gel compression vs gel swelling, etc.)



[2] Doudiès et al. J. Membr. Sci. 618 (2021) 118700

[3] Loginov et al. J. Membr. Sci. 630 (2020) 119289

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