

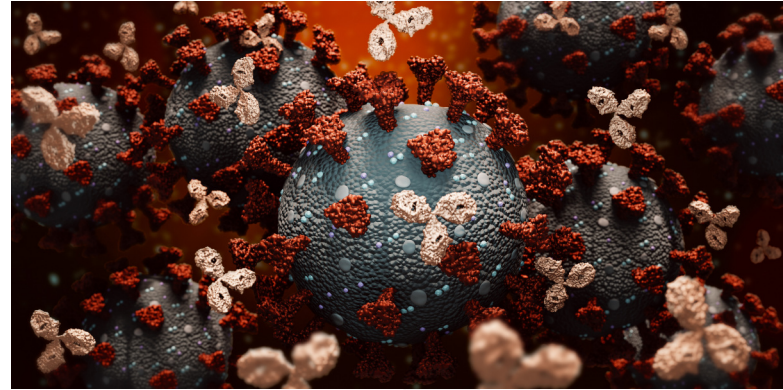
## Single-Pass VMF: Precipitated mAbs

### Single-Pass, Continuous Purification of Precipitated mAbs Using Vibro® Membrane Filtration (VMF)

Precipitation combined with Single-Pass Vibro® Membrane Filtration (VMF) is a potential alternative to Protein A chromatography, enabling continuous purification of precipitated mAbs. Contrary to conventional TFF, VMF reaching target concentrations in a single step while maintaining high flux and stable long-term operation.

#### Cost-Efficient Alternative to Protein A Chromatography

Protein A chromatography remains the industry standard for mAbs purification, but comes with high cost and challenges with integration in continuous processes. A possible alternative is the precipitation of proteins followed by single-pass filtration. However, conventional TFF is unable to reach target

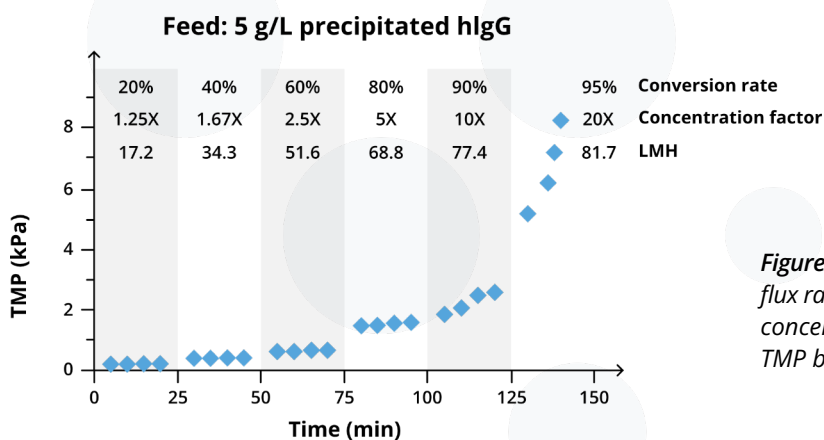


concentration in a single step and instead require more complex configurations with multiple units connected in series. In contrast, VMF effectively mitigates fouling using vibrations, enabling low-cost, single-step purification of precipitated mAbs.

#### High Concentration & Flux in a Single Membrane Module

In flux stepping experiments, VMF maintained stable TMP at flux rates of up to 77.4 LMH, reaching a conversion rate of 90% which corresponds to a 10× concentration factor. By operating the process below this critical flux rate, the development of

fouling can be controlled and stable operating conditions can be maintained over extended operating time. By enabling the efficient processing of precipitated mAbs in a single module, VMF simplifies and intensifies downstream processing.



**Figure 1:** In flux stepping experiments, VMF achieved critical flux rates of 77.4 LMH and conversion rates of 90% (10× concentration) before any significant fouling set in and its TMP became unstable.

#### Read the Article

Km Prottoy Shariar Piash, Claire MacElroy, Ziqiao Wang, Andrew L. Zydney: *Vibration-Assisted Single-Pass tangential flow filtration for processing precipitated proteins.* Separation and Purification Technology 376 (2025) 134136.



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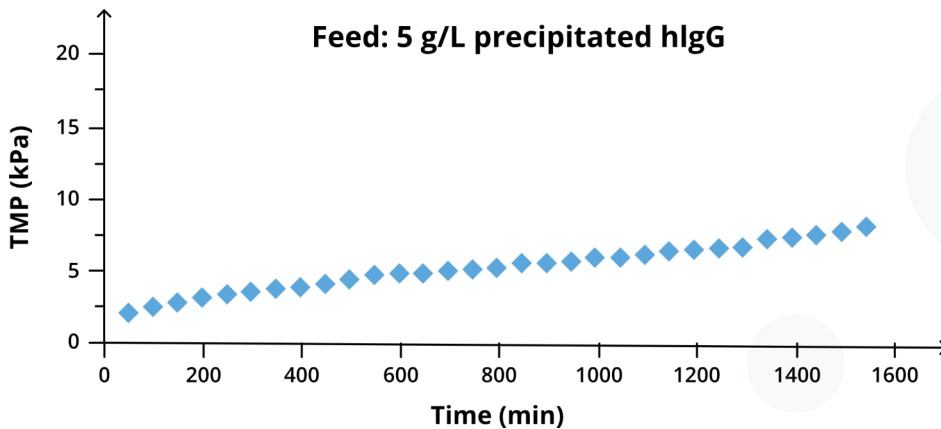


## Single-Pass VMF: Precipitated mAbs

### Stable, Continuous mAbs Purification

VMF demonstrated a highly stable process over 24 hours of operation at a constant permeate flux of 72.9 L/m<sup>2</sup>/h (85% conversion, 6.67× concentration factor) with no loss of precipitated hlgG in the

permeate. The remarkably low TMP increase during the entire process indicates that much longer running times may be possible, confirming VMF's potential for continuous processing.

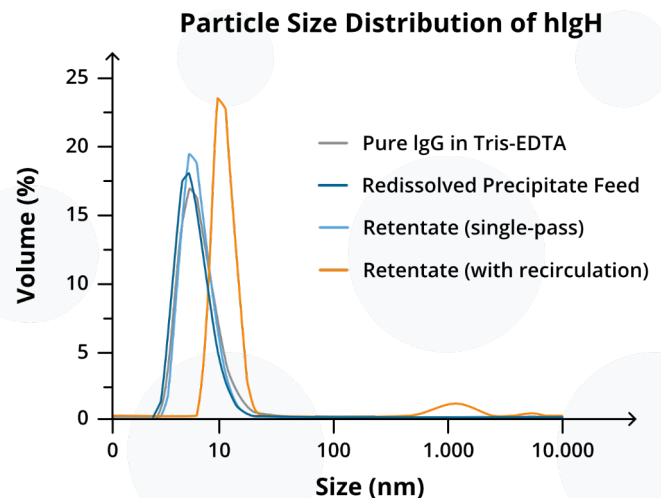


*Figure 2: VMF showed robust long-term performance with a remarkably low TMP increase.*

### Gentle Filtration of Sensitive mAbs

Analyzing the particle size distribution of the redissolved hlgG indicates that using Vibro® Membrane Filtration in single-pass continuous processing preserves product quality, with no observed aggregate formation and providing a purity profile matching the original feed.

*Figure 3: Samples from the recirculated hlgG during the 24-hours process revealed a significant change in particle size distribution, which is not observed for the single-pass product and can thus be attributed to prolonged recirculation. After single-pass filtration, hlgG size distribution in the retentate is essentially unchanged compared to the feed.*



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