Hydrogel composite material fabrication through light-mediated procedures for upscaling bioseparation processes

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Bioseparation processes for advanced manufacturing of high value proteins such as coagulation factors, cytokines, and growth factors have traditionally been separated from complex mixtures (including cell culture supernatants and plasma) by low pressure chromatography, utilising chromatographic matrices such as functionalised Sepharose.[1] However, these processes have not changed significantly over the years and now present a bottleneck for cost-effective manufacture of such proteins.

Here we report on the development of hydrogel composite membrane materials created using soft UVA photoinitiation with water soluble initiator, lithium phenyl-2,4,6-trimethylbenzoylphosphinate (LAP)[2], where various composite materials were fabricated that display varying microstructure and separation power. This soft curing process was developed to minimise reaction times, costs, and resources to generate reproducible and quality membrane materials for advanced bioseparations using tangential flow electrophoresis (TFE) processes.[3] We were able to demonstrate bioseparation processing to collect analytes of interest from complex systems such as plasma and crude expression media. The utility of these biomaterial membranes is that they have the capability to be fabricated on an industrial scale with high throughput and consistent production from batch to batch. Coupled with the TFE process, this combination makes for a powerful tool in terms of the next generation of advanced biomanufacturing to produce biologics with commercial and clinical benefits.

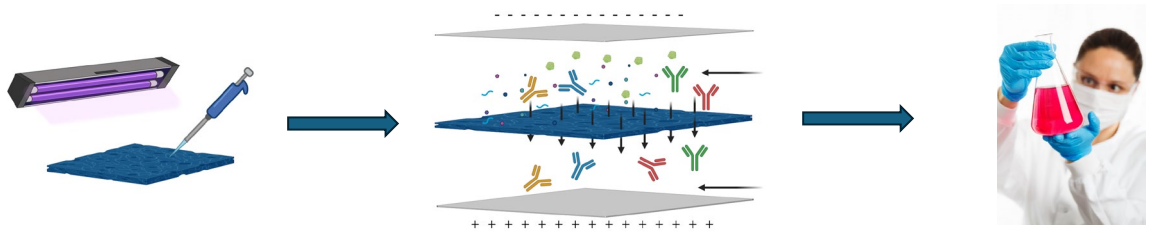

Figure 1: Schematic representation of membrane fabrication and bioseparation process to isolate valuable biological commodities.

References:

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