Vaccines save millions of lives every year, and improve the quality of life for countless others. Ultrafiltration (UF) is a size-based separation that is used in nearly all vaccine processes for product concentration, impurity clearance, and buffer adjustment. Polyethersulfone (PES) UF membranes, such as Biomax® from MilliporeSigma, are widely used in the industry. An advancement in the PES membrane manufacturing process can enable better uniformity, improved control of the membrane pore size, and the capability to produce custom variants that could enhance yield, purity, efficiency, and economics in new or existing vaccine processes.

The poster highlights the new capability by showing the relative retention of various pneumococcal polysaccharides across a range of membrane pore sizes or nominal molecular weight cutoffs. A custom membrane would allow the vaccine manufacturer to maximize the yield while maintaining acceptable purity. In conjugated polysaccharide (CPS) vaccines like those for pneumonia and meningitis, bacterial polysaccharides (PS) are chemically linked or conjugated to carrier proteins (CP), e.g. diphtheria or tetanus toxoid to enhance the immune response beyond that of the PS alone. UF membranes are used for the concentration and purification of each component, and are critical for the supply of vaccines worldwide.

One method to characterize the pore size distribution of UF membranes is through the rejection of mixed dextrans (Tkacik and Michaels1). In Figure 1, dextran rejection curves (rejection vs molecular weight) are shown for a number of membrane variants. In Figure 2, the molecular weight of the dextran rejected at 90% (R90) and the normalized water flux, are shown for a number of membrane variants along with boxes denoting the performance of standard commercial membranes.

Vaccine manufacturers may be able to improve yields in existing processes or to select a custom membrane to maximize yields in new processes. Please stop by the poster to find out more.