Modified Nanofiltration Membranes for Selective Separation of Sugar Solutions

Heath H. Himstedt, Katie Marshall, Sarah Williams, Ranil Wickramasinghe
Department of Chemical and Biological Engineering, Colorado State University

Abstract. Selective separation of solutions containing multiple sugars is a time-intensive process requiring such technologies as size-based chromatography, which can only process a small amount of volume per batch. It is desired to achieve separation of multiple sugars using an efficient and continuous process. The work presented here demonstrates one interesting method: pH-responsive nanofiltration membranes. Commercially-available membranes have been modified by grafting polymer brushes onto the membrane surface. Under the influence of pH, the brushes can reversibly change their confirmation to become more hydrophobic or hydrophilic. It is demonstrated that certain sugars are preferentially rejected depending upon the configuration of the polymer brushes on the membrane surface. This preferential rejection can be used to selectively concentrate one sugar from another in a continuous manner allowing for larger volumes of solutions to be treated.