

## REGENERABLE LBL-MODIFIED NANOFILTRATION MEMBRANES FOR WATER TREATMENT

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### Abstract

During the last three decades, considerable efforts have been devoted to the development of surface functionalization techniques. Twenty years ago, our group has developed a technique called “Layer-by-Layer” (LbL) that allows the modification of a wide variety of surfaces with a large number of materials.[1] Today it has become a powerful tool for building polyelectrolyte multilayer (PEM) films and more complex multicomponent systems with nanoscale precision.[2] This allows us to transform ultrafiltration membranes for nanofiltration purposes. Here, the LbL-assembly was used to develop nanofiltration membranes with ultrathin separation layers for water treatment. LbL-deposition of polyelectrolyte multilayers made of poly(sodium 4-styrenesulfonate) and poly(diallyldimethylammonium chloride) was carried out by various deposition methods (dipping and spray-assisted). As it is very difficult to characterize nanoscale films on porous supports like membranes using typical surface characterization techniques, film growth and homogeneity were studied on membrane-like surfaces prior to coat ultrafiltration membranes and to investigate their permeability and selectivity as a function of the number of deposited layers. It has been found that a minimum thickness of 17 nm PEM improved the retention towards  $\text{MgSO}_4$  from  $5.9 \pm 2.3$  % (uncoated membrane) to  $84.6 \pm 1.9$  %. A low cost and environmental friendly regeneration of the separation layer were made to maintain the membrane performance. LITERATURE: [1] Decher G., Science 1997, 277, 1232; [2] Decher G. and Schlenoff J.B., Multilayer Thin Films: Sequential Assembly of Nanocomposite Materials; eds., Wiley-VCH: Weinheim, 2012

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