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# Electric Field Assisted Layer-by-Layer Assembly of Graphene Oxide Containing Nanofiltration Membrane

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## Abstract

An external electric field (EF) was applied to assist the preparation of graphene oxide (GO) and polyethyleneimine (PEI) layer-by-layer films on hydrolyzed polyacrylonitrile (H-PAN) substrate. The property and structure of the resultant membranes were characterized by FTIR, scanning electron microscope (SEM), atomic force microscopy (AFM), electrokinetic analyzer and water contact angle goniometer. The effect of assembly conditions (e.g. EF voltage, deposition time, GO concentration and number of PEI/GO bilayers) on nanofiltration (NF) performance of LbL membranes was systematically investigated. The optimized preparation conditions were 5 V EF voltage, 3 min deposition time, 0.025 mg/ml GO, and 2 PEI/GO bilayers. The resultant EF assisted LbL membrane exhibited a flux of 65.6 $l \cdot m^{-2} \cdot h^{-1}$ and a rejection of 80.9% to 0.5 g/l $MgCl_2$ at 0.40 MPa. Salts rejection of $LbL_{2.0}$ membrane followed the sequence of $Na_2SO_4$ > $MgSO_4$ > $MgCl_2$ > NaCl, which

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