Graphene oxide membranes for water filtration

氏名：Aaron Morelos Gomez

所属：信州大学アクアイノベーション拠点

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自己紹介：I am a nanomaterials scientist from Mexico. I am interested in carbon nanomaterials synthesis and applications such as water desalination, food filtration, anti-fouling, etc. I try my best to give innovative solutions to problems and use new materials and tool for research.

本文：The demand of water is increasing, where fresh water sources are dimishing and improved methods for water reclamation are needed. This is fundamental in order to create self-sustaining societies. Graphene oxide (GO) membranes have been widely studied for water filtration, however there are few scalable methods to produce large membranes. In addition, chemical stability and antifouling properties are needed in order to be promising candidates for real applications. In this work, we present a spray-coated GO membrane for water filtration. Its desalination performance was measured for a mixture of GO/few-layered graphene and only GO, where salt rejection can reach between 80% and 90% and a permeate flux of 0.1 - 0.4 $m^3m^{-2}day^{-1}$. The membranes with few-layered graphene exhibited an increased chemical resistance against chlorine. Furthermore, protein fouling against negative and positive charged proteins bovine serum albumin and lysozyme, respectively, was carried out by monitoring variations in permeate flux and microscopy. The GO membranes demonstrated excellent anti-fouling against both membranes due to electrostatic interactions, hydrophilicity and surface smoothness. The present membranes have excellent scalable fabrication method, chemical resistance and anti-organic fouling necessary for real-world applications in water reclamation, desalination, food industry, etc.