

High flux Starbon@GO composite membranes for wastewater treatment

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Abstract:

Two-dimensional (2D) carbon nanostructures with tunable physicochemical properties-based materials such as graphene oxide (GO) has excellent potential for wastewater treatment. Low flux and fouling are estimated as drawbacks of GO membranes despite the excellent performance in water treatment. Herein, a new high flux GO modified with starch-derived mesoporous carbonaceous material (Starbon) (Starbon@GO) membrane were designed for wastewater treatment. The sponge like structure of Starbon achieve specific interactions with GO sheets and provide high flux to Starbon@GO composite membranes. Moreover, the biodegradable and sustainable nature of Starbon reduces environmental problems during production and disposal. The vital properties of the designed Starbon@GO membranes were studied by field emission scanning electron microscopy (FESEM), transmission electron microscopes (TEM), energy dispersive spectroscopy (EDS), X-ray diffraction (XRD), and water contact angle techniques. The performance of the prepared Starbon@GO membranes was assessed with respect to the water flux, rejection efficiency, antifouling properties and durability. The 4%Starbon@GO (4:96 wt % of Starbon:GO) membrane demonstrated high pure water flux of $624 \text{ L m}^{-2} \text{ h}^{-1}$, wettability (29°), water uptake (89%), and porosity (74%). The best 4%Starbon@GO membrane, can be recommended for wastewater treatment applications.

Keywords: Graphene oxide, starbon, wastewater treatment, membrane, two-dimensional.