

Graphene Oxide Membranes and Membrane Cascades for Lignin Separation and Fractionation from Biorefinery Streams

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Abstract

Reduced graphene oxide (rGO) membranes are increasingly recognized as a promising technology for energy-efficient and cost-effective fractionation and separation of diverse and complex biomass mixture streams, including kraft black liquor and other biorefinery feedstock/byproduct streams. We have fabricated rGO membranes with a range of molecular weight cut-offs (MWCOs) and employed them in two-stage membrane cascades to produce lignin fractions of different molecular weight distributions from kraft black liquor and soda pulp non-wood co-products. We present a detailed discussion of the separation characteristics of the rGO membranes, as well as detailed analysis of the resulting lignin fractions including the molecular weight distributions, lignin recovery, and other parameters. These purified lignin fractions can be utilized to make high-value products such as specialty coatings and nanomaterials.