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Graphene oxide membrane for liquid phase organic molecular separation RENLONG LIU, GIRISH ARABALE, JINSEON KIM, KE SUN, YONGWOON LEE, CHANGKOOK RYU, CHANGGU LEE, Sungkyunkwan Univ — The selective permeation of organic solvents and water through graphene oxide (GO) membranes has been demonstrated. Water was found to permeate through GO membranes faster than various alcohols. The permeation rates of propanol are about 80 times lower than that of water. Taking advantage of the differences in the permeation rates, we separated water from the alcohols and obtained alcohols with high purity. For ethanol and 1-propanol, binary solutions of the alcohol and water were filtered efficiently to produce alcohols with concentration of about 97%. However, the selectivity of the filtration of methanol is significantly lower than those of the other alcohols. To understand the mechanism we followed the structural changes in the GO membranes by X-Ray diffraction analysis. From the X-ray diffraction results we speculate that the selectivity of the permeation of water and alcohols is closely related to the molecular sizes of the solvents and their polarity. In order to demonstrate the potential applications of this process for the selective removal of water from aqueous organic mixtures, we performed the separation of water from a bio-oil containing 73% of water. The majority of the water was filtered out resulting in a higher purity bio-oil.

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