Tunable Nanofiltration Performance of Ultrathin Graphene Oxide Membranes by Surface Morphology Control of Support

남윤태, 김선준, 강경민, 정우빈, 김대우, 정희태†
한국과학기술원
(heetae@kaist.ac.kr†)

Ultrathin (< 50 nm scale) graphene oxide (GO) membrane has great potential for ultrafast flux membrane with uniform surface and well-defined pore structure. However, laminated structure is easily changed by external factors such as functionalization of nanosheets, fabrication method and especially surface morphology of support due to extremely thin thickness. In this work, we investigated surface roughness effect on nanofiltration performance through nanostructure of GO membranes, controlling systematically wrinkled structure of support. The laminates on flat surface have tight interlayer and block water molecules to pass through at interface between GO and support but, when deposited on rough surface, it showed loose interlayer and free volume at interface, facilitating fast water transport. This effect attributed that ultrathin GO membrane on wrinkled support indicated 6.4 times enhanced permeation of water as compared with that of the GO membrane on flat one while maintaining high rejection of all dye molecules. The tunability of nanostructure through support control can provide development for ultrathin GO membrane in water purification.