Abstract (Oral Presentation)

The increasing depletion of surface and underground water aquifers necessitates the re-use and purification of waste waters. Among the existing separation membrane materials, graphene oxide (GO) is a promising candidate, owing to its tunable physicochemical properties. However, the widening of GO membranes pore gap in aqueous environments is a major limitation. Crosslinking agents can be incorporated onto GO nanosheets as an attempt to alleviate this problem. This study thus describes a comparative analysis of uncrosslinked and p-Phenylenediamine (PPD) crosslinked GO membranes' water purification performance. Dip-coating and dip-assisted layer by layer methods were used to fabricate the uncrosslinked and crosslinked membranes respectively. Fourier Transform Infra-Red (FTIR) characterizations were undertaken to verify the covalent interaction between GO and PPD. Scanning electron microscopy (SEM) was also used to analyse membrane topographical continuity and intactness while water contact angle measurements were undertaken to analyse membrane hydrophilicity. The nanofiltration tests were performed through the separation of methylene blue (MB) from water in a homemade nanofiltration cell operated at 1 bar. The improvement impact of the crosslinker was manifested on the enhancement of the stability and performance of the membranes. At 5 bi-layers, up to ~100% rejection of MB was achieved at a flux of 1.8 l/m^2.hr.bar for the PPD crosslinked membranes while only 87.4% rejection at a flux of 2.0 l/m^2.hr.bar was achieved for the uncrosslinked membranes.