Title: Super hydrophilic TiO2/HNT nanocomposites as a new approach for fabrication of high performance thin film nanocomposite membranes for FO application

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Abstract: In this work, titanium dioxide (TiO2) nanoparticles/halloysite nanotube (HNT) nanocomposites synthesized via one-step solvothermal method were used as nanofillers in the preparation of thin film nanocomposite (TFN) membranes for forward osmosis (FO) application. With respect to separation performance, it was reported that the TFN membrane incorporated with 0.05%(w/v) TiO2/HNTs (denoted as TFN0.05) exhibited the best performance due to its high water permeability and low reverse solute flux when tested using 10mM NaCl feed solution and 2.0M NaCl draw solution under two different membrane configurations. Moreover, compared to control membrane, the fabricated TFN0.05 membrane showed significantly better antifouling affinity against bovine serum albumin (BSA) as well as complete recovery of water flux after a simple water cleaning process. The results revealed that fouling in the TFN0.05 membrane is fully reversible. Overall, it can be concluded that the unique tubular structure of HNTs coupled with the excellent anti-fouling features of TiO2 have madeTiO2/HNTs a reliable material with a bright perspective in improving the antifouling affinity of conventional thin film composite membranes for FO applications. To the best of the authors' knowledge, this is the first study dedicated to the application of composite nanomaterials for the development of TFN FO membranes.