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Graphitic-like carbon nitride improved thermal stability and photocatalytic antifouling performance of polyether sulfone membranes

Manying Zhang[a,b,*], Minglai Fu[b], Kaisong Zhang[b,*]

[a]*School of Chemical and Environmental Engineering, Jiangsu University of Technology, Changzhou 213001, China, Tel. +86 592 6190782, Fax +86 592 6190534, email: myzhang@jsut.edu.cn (M.Y. Zhang)*
[b]*Institute of Urban Environment, Chinese Academy of Sciences, 1799, Jimei Road, Xiamen, China, Tel. +86 592 6190782, Fax +86 592 6190534, email: kszhang@iue.ac.cn (K.S. Zhang)*

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ABSTRACT

The poor thermal tolerance of organic membrane and membrane fouling are two of the main obstacles for wider application of membrane process. Adding inorganic compounds which own fascinating chemical property and thermal stability as the additives may be an effective method to alleviate the problems. In this study, different amount of graphitic carbon nitride (g-C_3N_4) were introduced into polyether sulfone (PES) membranes by the phase-inversion method. The impacts of the g-C_3N_4 addition on the structure, thermal stability, filtration property and photocatalysis of g-C_3N_4/PES nano composite membranes were systematically studied. The results illustrated that the g-C_3N_4 well dispersed into PES matrix without obvious aggregation. The g-C_3N_4 introduction slightly improved the hydrophilicity of the nano composite membrane and did not sacrifice the separation property. The thermal stability of g-C_3N_4/PES nano composite membranes was examined in terms of thermogravimetric analyses (TGA) and water flux recovery ratio (FRR) after which were heated treatment at different temperature (50–80 °C) for different times (30–240 s). The results revealed that the thermal stability and the filtration performance of PES membrane were significantly improved by the incorporation of g-C_3N_4 nanosheets. Also the addition of g-C_3N_4 nanosheets could endow the nanocomposite membranes with photocatalytic antifouling property.

Keywords: Graphitic carbon nitride; Thermal stability; Photocatalysis; Antifouling

*Corresponding author.