PHOTOCATALYTIC PROPERTIES OF PVDF MEMBRANES MODIFIED WITH GRAPHITIC CARBON NITRITE

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Graphitic carbon nitrite (g-C_3N_4) is a promising photocatalyst owing to its low cost, simple synthesis, high chemical stability, and visible-light response, which is especially important in terms of the membrane modification. Immobilization of photocatalysts onto the membrane surface can solve the issue of removal of nanoscale catalysts from the reaction mixture. So, the main aim of this research was the surface modification of polyvinylidene fluoride membranes (PVDF) with graphitic carbon nitride.

Graphitic carbon nitride was synthesized via heating of melamine. Commercial PVDF ultrafiltration membranes with cut-off of 150 kDa were activated with a carbonate buffer and g-C_3N_4 was subsequently attached by terminal amino groups. The structural and morphological properties of g-C_3N_4 and membrane materials have been characterized using TEM, SEM-EDX, FTIR and EDX analysis. Fig. 1 shows the surface morphology of the pristine PVDF membrane and the membrane modified with g-C_3N_4. As can be seen for the pristine membrane, the surface is uniform with many pores. After modification, a layer of g-C_3N_4 together with agglomerated nanoparticles was observed on the surface of the membrane.

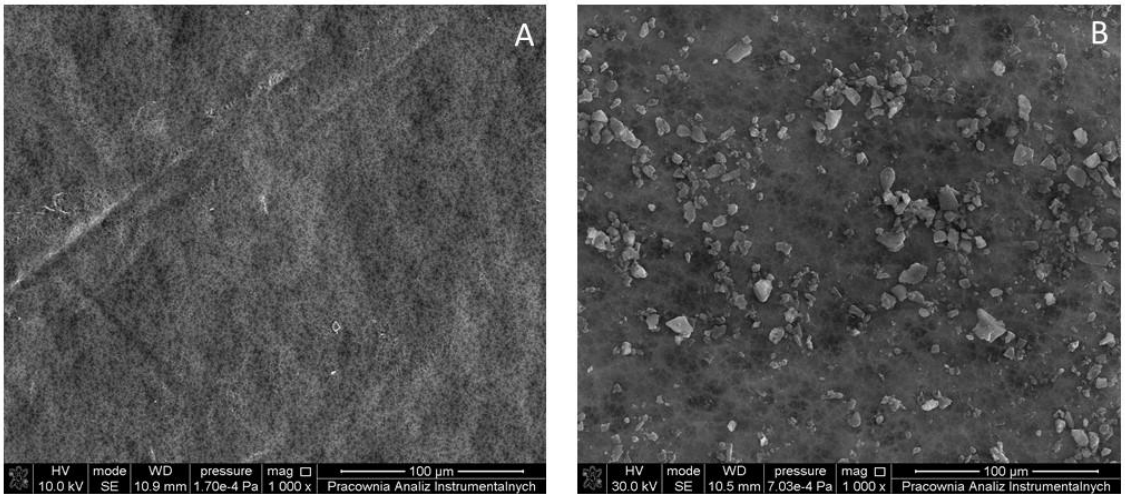

Fig. 1. SEM images of the pristine (A) and the modified (B) PVDF membranes

The performance of the modified membranes used for the decomposition of Rhodamine B and Rhodamine 6G dyes at different pH values in the presence of scavengers was evaluated. The mechanism of dyes photodecomposition by membranes was additionally assessed. The examination of the initial dye concentration on the rejection and decomposition of Rhodamines by PVDF-g-C_3N_4 membranes was conducted in the dead-end and crossflow filtration modes.

The yield of dyes decomposition was about 80% and 85% for Rhodamine B and Rhodamine 6G, correspondingly, within the range of dye concentration from 5 to 50 mg/L. PVDF-g-C_3N_4 membranes were characterized with high stability and reusability in process of dyes ultrafiltration in the crossflow mode.

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