



Preparation of PAN/lycopene-TiO₂ nanocomposite membrane for azo dye degradation

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ABSTRACT

In this study, lycopene TiO₂ nanoparticles complex incorporated electrospun polyacrylonitrile (PAN) nanocomposite membrane was prepared for azo dye degradation by electrospinning process. The material was characterized by using scanning electron microscopy and Fourier transform infrared spectroscopy. Membrane surface wettability, membrane performance and Congo red dye degradation were studied and the degraded products were identified by gas chromatography mass spectroscopy. From the results, it was found that the 30% of lycopene TiO₂ nanoparticles complex incorporated electrospun PAN nanocomposite membranes showed better surface wettability, pure water flux and antifouling property than the other membranes. These membranes also showed higher dye degradation efficiency than the other membranes due to better distribution and lesser agglomeration of lycopene TiO₂ nanoparticles complex. Among the nanocomposite membranes with 30% of lycopene TiO₂ nanoparticles complex, the membrane which was electrospun for 5 h showed higher membrane surface wettability, optimum pure water flux, higher recovery ratio and higher percentage of congo red dye degradation. Hence this membrane can be effectively used as a photocatalytic membrane to degrade azo dyes under visible light irradiation.

Keywords: Lycopene TiO₂ nanoparticles complex; Polyacrylonitrile; Nanocomposite membrane; Dye degradation; Electrospinning

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