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Synthesis and characterization of polyester bionanocomposite membrane with ultrasonic irradiation process for gas permeation and antibacterial activity

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Abstract

Optically active bionanocomposite membranes composed of polyester (PE) and cellulose /silica bionanocomposite (BNCs) prepared with simple, green and inexpensive ultrasonic irradiation process. It is a novel method to enhance the gas separation performance. The novel optically active diol containing functional trifluoromethyl groups was prepared in four steps reaction and it was fully characterized by different techniques. Commercially available silica nanoparticles were modified with biodegradable nanocellolose through ultrasonic irradiation technique. Transmission electron microscopy (TEM) analyses showed that the cellulose/silica composites were well dispersed in the polymer matrix on a nanometer scale. The mechanical properties nanocomposite films were improved by the addition of cellulose/silica. Thermo gravimetric analysis (TGA) data indicated an increase thermal stability of the PE/BNCs in