

Analysis by SEM of polymer membranes obtained from polyamide 6 nanocomposites

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Abstract – In this work, polymer membranes were produced from polyamide 6 (PA6) and clay consisting of silicates layer from of Paraíba/Northeast of Brazil by immersion-precipitation technique. The clay was organically modified using the quaternary ammonium salt, Dodigen, and the results from XRD showed the insertion of the salts molecules into silicates layer. The morphological structure of the nanocomposite presented a partially exfoliated arrangement [1]. The obtained membranes were analyzed by SEM. It is composed by two layers, a skin and a porous support. The presence of clay altered the membrane morphology, decreasing the porous size.

Nanocomposites are known by conferring material with combined characteristics, with the aim to improve thermal, optical, and mechanical properties, also to decrease flammability and to act as barrier, with low content of filler. The filler is in the matrix, forming two dispersed phases where one of them have nanometer dimensions [2]. In this work, membranes were produced from hybrids organic/inorganic of polyamide 6 and clay mineral constituted of silicate layers, from Paraíba, and compared with membrane prepared from pure polymer. The sodium clay was used as received and modified by an organic compound, to becomes compatible with the polymer. Clay was treated with quaternary ammonium salt such as Dodigen through cation exchange in aqueous phase to favor the interaction between the filler and the matrix. From these nanocomposites, it was synthesized the membranes by making a dissolution in predetermined amounts of specific solvent and a precipitation in a non solvent (immersion-precipitation technique) forming thin films. Thus, on the basis of the results, it can be observed significant alteration in the structure/morphology of the pores and porosity of the membranes. The Figure 1 presents the polyamide 6 membrane with pores well distributed and bigger pores, and the Figure 2 shows the PA6/Dodigen membrane with lesser pores and finger pores, possibly due to a precipitation with delay. In general, it can be seen that the presence of the clay changed significantly the morphology of the membrane.

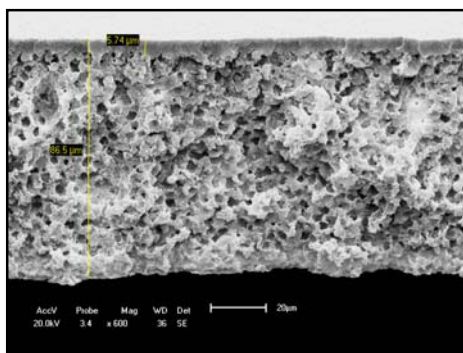


Figure 1: SEM images from the cross section of PA6 membrane.

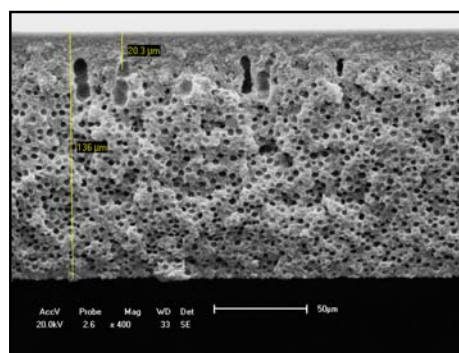


Figure 2: SEM images from the cross section of PA6/Dodigen membrane.

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[2] E. M. Araújo; T. J. A. Mélo; L. N. L. Santana; G. A. Neves; H. C. Ferreira; H. L. Lira; L. H. Carvalho; M. M. Ávila Jr.; M. K. G. Pontes; I. S. Araújo. *Mat. Sci. and Eng. B*. 112 (2004).