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# OXYGEN BARRIER PROPERTIES OF POLYIMIDE NANOCOMPOSITE FILMS WITH VARIOUS EQUI-BIAXIAL STRETCHING RATIOS

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This study focused on the synthesis of new polyimide (PI)/Cloisite 30B hybrid films by using the in-situ solution intercalation method via poly(amic acid) (PAA). The clay contents of the nano-hybrid films were varied from 0.5 to 1.5 wt%, and the effects on the thermo-optical properties, morphologies, and gas permeability of the films were examined. The morphological studies indicated that the dispersion in the PI matrix was better at a lower organoclay loading than at a higher organoclay loading. For low clay contents (1.0 wt%), the clay particles were well dispersed in the matrix polymer without significant agglomeration of particles. The thermal properties (Tg, TDi, and CTE) and oxygen barrier properties of the PI hybrid films were found to be improved with the addition of clay up to a critical clay loading, and then to be worsen above that critical content. The values of YI were found to vary from 1.70 to 6.56 with the organoclay content from 0 to 1.5 wt%. Our UV-vis measurements showed that the PI hybrid films had excellent transparency, which decreased slightly with the organoclay content. PI hybrid films containing 1.0 wt% Cloisite 30B were stretched equi-biaxially with various stretching ratios in the range of 100-140% to investigate their optical transparency and oxygen permeability in detail; the variations with the equi-biaxial stretching ratio of the clay dispersion and morphology were also determined. PI hybrid films with ? 120% stretching were found to contain homogeneously dispersed clay in the polymer matrix and exfoliated nanocomposites. The highest barrier to oxygen permeation was found to arise for an equi-biaxial stretching ratio of 130%.