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Compatibilization and Property Characterization of Polycarbonate/Polyurethane Polymeric Alloys

P. S. Archondouli, J. K. Kallitsis, N. K. Kalfoglou

Department of Chemistry, University of Patra, 26500 Patra, Greece

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There were four typographical errors on p. 618 of this article when it was originally printed. It is reprinted correctly on the following page.

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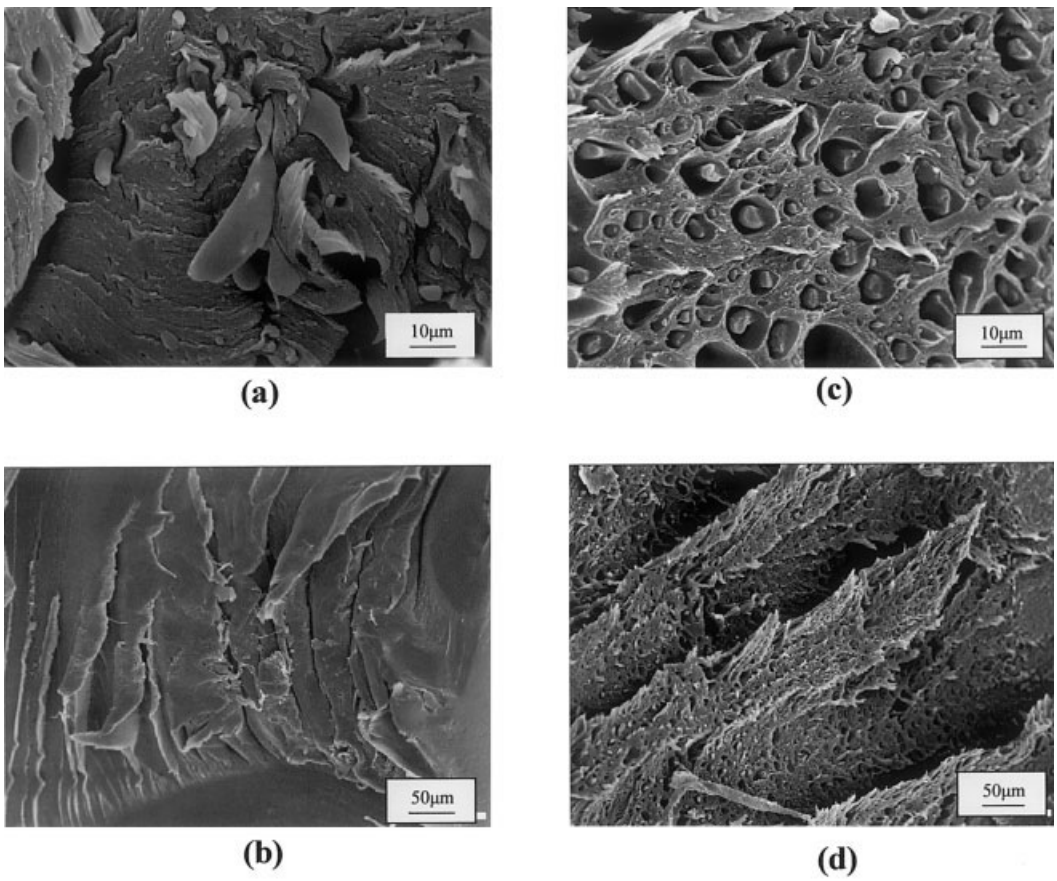

Figure 6 SEM images of PC/PU blends fractured at ambient temperature: (a,b) 90/10 and (c,d) 70/30.

Aging had no effect on the morphology, the high component viscosity preventing any morphological transformation [cf. Fig. 3(e–h)].

SEM

SEM micrographs in Figures 4–6F6 give additional information on the phase distribution and component adhesion of the fractured surfaces. In Figure 4, the transition from a morphology with a fracture typical of a homogeneously mixed blend [Fig. 4(a)] to an interpenetrating morphology [Fig. 4 (b,c]] to a spherical domain morphology [Fig. 4(d)] is evident. At a higher magnification (Fig. 5), these morphologies are amplified, and in Figure 5(b–e), one can discern the fissures caused by the expansivity mismatch of the two components at cryogenic temperatures. For the 30/70 composition, quite a few of the PC globules were firmly embedded in the PU matrix. In Figure 6, fracturing at the ambient temperature shows a mixed glassy–ductile morphology for the 90/10 composition, the rubbery component being elongated [Fig. 6(a)] but anchored in the glassy matrix [Fig. 6(b)]. In Figure 6(c,d), one can observe that the composite globules of PU, although broken during deformation, remained attached to the PC matrix. Because of matrix elongation, the dewetting of the PU particles at their equator took place [see the gaps around the inclusions in Fig. 6(c)].

Mechanical properties

Tensile properties

The data and standard deviations for the ultimate properties, including the yield stress (σ_y), are summarized in Table I for blends quenched to 0°C. A large deformation behavior in terms of the tensile strength (σ_b) and, in particular, the elongation at break (ϵ_b), a sensitive indicator of component adhesion in blends, was used to evaluate the mechanical performance and to optimize the mixing conditions. Mixing at temperatures greater than or equal to 260°C resulted in the deterioration of the mechanical properties, and this, as well as the effect of annealing, was discussed in the last section. Annealing led to an enhanced phase separation, which was confirmed by DMA and phase-contrast microscopy. The lower t_{mix} value was adopted because pertinent data showed less scatter and greater t_{mix} values led to higher weight losses in TGA (discussed later). Aging did have an adverse effect on the tensile properties of a PC-rich blend (70/30), possibly the result of phase agglomeration,