

고분자블렌드의 상거동과 기계적 물성

(Phase Behavior and Mechanical Properties of Polymer Blends)

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Although many miscible polymer pairs have been identified, phase-separated blends are preferred for achieving useful results in many instances. It is often necessary to improve the toughness of glassy polymers by adding rubbery polymers. The degree of improvement in toughness is influenced by numerous factors, one of which is the level of adhesion of rubber to the matrix polymer. To understand the adhesion at the interface, the phase behavior between matrix polymer and rubbery phase needs to be investigated.

To improve the mechanical properties by improving miscibility between matrix and rubber, two approaches can be applied. One is to add the third component which may be miscible with both components in the blend and the other is to introduce the specific functionality on each polymer to induce a reactive formation of copolymers which may act as a compatibilizer. The changes in miscibility and mechanical properties such as tensile properties, impact strength, etc, are presented when the third components are added.

One way of preparing phase separated blends is to thermally treat the miscible blend above its phase separation temperature. As the phase separation proceeds for miscible blends, changes in morphology takes place. The initially molecularly mixed blend becomes less connective during phase separation though the interfacial adhesion of phases still remains in spinodal decomposition. Also, the interfacial region is developed between phases during phase separation. The interfacial adhesion between two phases becomes weaker with the progress of phase separation. Another factor affecting the tensile properties is the change in glass transition temperature of the blend with phase separation.

In the present study, the effect of phase behavior on the mechanical properties are presented for the toughening of glassy polymers with or without the so called compatibilizers. Changes in mechanical properties with thermally induced phase separation are examined with various possible factors.