

Effect of affinity of grafted polymer on the viscoelasticity and film processability of PMMA blended core-shell rubber

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Abstract. We investigated the rheological behavior and film casting processability of PMMA blended with core-shell rubber (CSR) which has been used for various applications because of its excellent transparency and mechanical properties. We carried out linear viscoelastic properties of various types of CSR and evaluated their film processability. At low frequency G' and G'' of CSR showed the weak frequency dependence. This tendency was more conspicuous than that of CSR which has miscible graft polymer with matrix in comparison with CSR with low affinity to PMMA. And CSR which has better affinity to PMMA gave rise to a lot of die line (one of film casting behavior) compared with CSR with immiscible grafted polymer with matrix.

Keywords: PMMA, core-shell acrylic rubber, graft polymer, viscoelasticity, film processability, die line

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To improve toughness of PMMA, blending core-shell acrylic rubber were developed recently as reported for ABS to enhance to toughness of AN¹⁾. Core is consisted of crosslinked polybutylacrylate(PBA) based rubber and shell is PMMA based polymer to give compatibility with PMMA²⁾. Various types of core-shell rubbers were prepared by emulsion polymerization, e.g., high or low dispersy of CSR into PMMA by changing the composition (using methacryl acid or benzyl methacrylate as polarity adjusting monomers) of graft polymer on the core rubber.

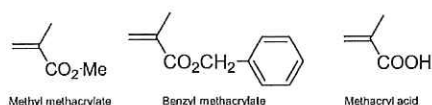


FIGURE 1. Monomers of graft polymer on the core rubber

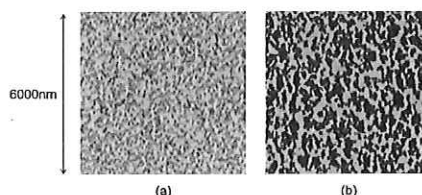


FIGURE 2. TEM pictures of CSRPs (a)high dispersy, (b)low dispersy

The storage modulus G' and the loss shear modulus G'' of CSR were influenced by contents of the rubber, degree of crosslinking of the rubber and polymer content of the shell grafted on the rubber (core). At low frequency G' and G'' of CSR showed the weak frequency dependence, while PMMA indicated the terminal relaxation. And this tendency

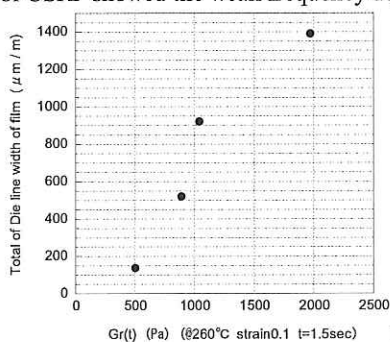


FIGURE 3. Relationship between $G_r(t)$ and film die line

References

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