Reactive Compatibilization of Immiscible Polystyrene/Polyamide-6 Blends using Polystyrene grafted with Maleic Anhydride

박 찬동, 조 원호
서울대학교 공과대학 섬유고분자공학과

INTRODUCTION

Recently more attention has been focused on reactive melt processing[1-2] in the compatibilization of immiscible polymer blends, making it an attractive cost-effective alternative. In this study, polystyrene(PS)/ polyamide-6 (PA-6) blends were reactively compatibilized by addition of various polystyrenes grafted with maleic anhydride (MAH) obtained through melt extrusion. We investigated the effect of reactive compatibilizers in terms of morphology, interfacial adhesion between the PS/PA-6 phases and rheological properties.

EXPERIMENTAL

The commercial grade PS (Mn = 120000) and PA-6 (Mn = 20000) were obtained from Han Nam Chem. Co. and Tong Yang Nylon Co., respectively. Two grade PS(Mn = 15000, 65000) were synthesized by suspension polymerization. MAH and bis(t-butyl peroxyisopropyl) benzene initiator were used to functionalize PS. The functionalization of PS with MAH was carried out using Brabender twin screw extruder. Mixtures of the commercial PS, PA-6 and functionalized PS (PS-*g*-MAH) were melt-blended in a Brabender single screw extruder. The grafting of maleic anhydride onto PS was confirmed with FTIR(BOMEM). The morphology of the blends was examined by SEM(JEOL 840A).

RESULTS AND DISCUSSION

As the content of MAH grafted onto PS increases, the domain size of dispersed PS phase is reduced as shown in Fig.1. Fig.2. shows the morphological changes of 20/80 PS/PA-6 blends when various molecular weight polystyrenes(Mn=15000, 65000, 120000) grafted with MAH are added. Higher molecular weight PS-*g*-MAH reduces the size of dispersed PS phase more effectively than low molecular weight PS-*g*-MAH does. It is not clear whether this effectiveness comes from molecular weight of PS-*g*-MAH or chain length between the two functional groups of MAH within PS-*g*-MAH copolymer. To investigate the effectiveness of various molecular weight of PS-*g*-MAH, it will be discussed in terms of thermal, rheological and mechanical properties of blends.

REFERENCES

1. J. R. Campbell, S. Y. Hobbs, T. H. Shea, and V. H. Watkins, *Polym. Eng Sci.*, **30**, 1056(1990).
2. I. H. Park, J. W. Barrow, and D. R. Paul, *J. Polym. Sci., Polym. Phys. E* **30**, 1021(1992).

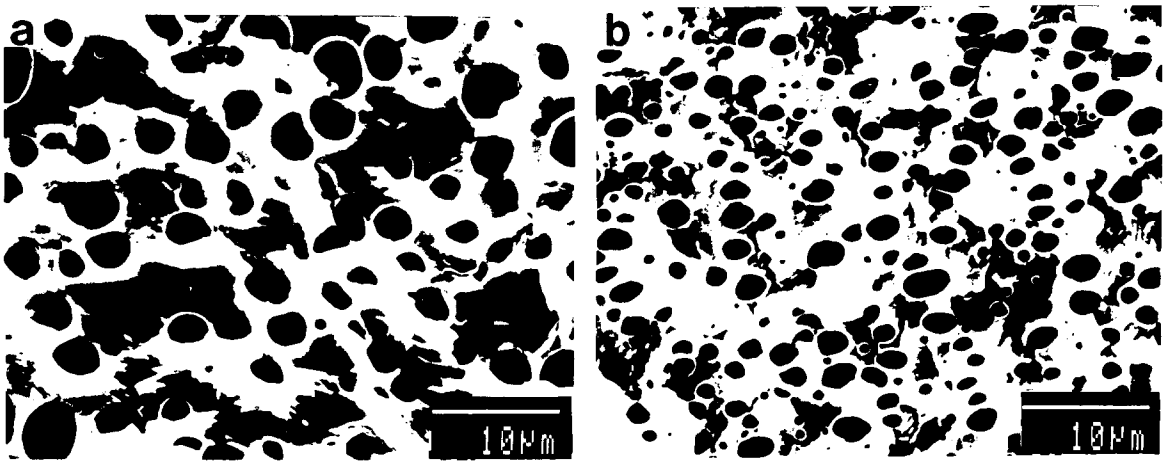

Fig.1. Scanning electron micrographs of 20/80 PS/PA-6 blends when the PS-*g*-MAH copolymers (5 wt%) with different content of MAH are added : (a), 0.5 wt% MAH ; (b) 0.8 wt% MAH.

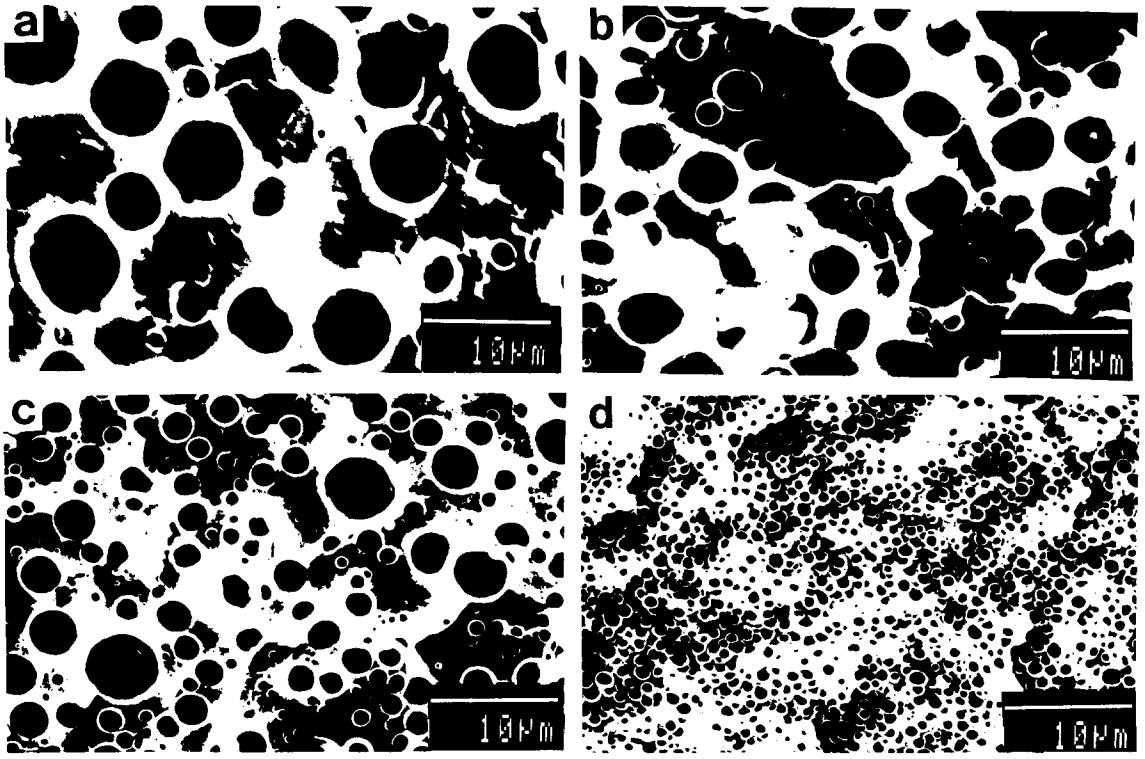

Fig.2. Scanning electron micrographs of 20/80 PS/PA-6 blends with the PS-*g*-MAH copolymers (5 wt%) of different molecular weight : (a) without PS-*g*-MAH ; (b) Mn = 15000 ; (c) Mn = 65000 ; (d) Mn = 120000.