PREAMBLE

Polyblends-'86" was the 7th annual symposium on polymer alloys and blends organized and sponsored by the Industrial Materials Research Institute of the National Research Council Canada (NRCC/IMRI). The previous six also have been published in *Polymer Engineering and Science*: 22(2), 22(17), 24(2), 24(17), and 26(1). The symposium, held in Montreal, Canada, on April 4, 1986, was part of the 2nd Annual Meeting of the Polymer Processing Society (International). IMRI organizes as well two other symposia series on modeling of plastics processing and properties and on polymer composites; these are published respectively in *Polymer Engineering and Science* and in *Polymer Composites*. The entire symposia are recorded, and the tapes of the presentations and discussions are kept in the NRCC/IMRI library for two years, available to anyone interested in the subject.

"Polyblends-'86" was the largest symposium on polymer blends organized by IMRI. With speakers from nine countries, it had a stimulating international character that is reflected in the content of these special issues.

When organizing "Polyblends-'86," we tried to encourage presentation of papers on three particularly important aspects of polymer blends: (1) interfacial properties, (2) flow-induced morphology, and (3) engineering blends.

The effects of the interfacial properties are of increasing interest to researchers and manufacturers. The existing methods of measurements are cumbersome and limited in scope. Better theories and test procedures are badly needed. Both these aspects were discussed extensively during the meeting.

The performance of a pair of blended immiscible polymers depends on their chemical nature and blend composition. Within a low concentration region of the minor phase, say less than 13 volume percent, only spherical particles are to be expected. The size of the spheres decreases to zero as miscibility is improved. Similar size reduction is observed at higher loading, where co-continuous structures predominate. Addition of a compatibilizer, which in principle does not change the polymer-polymer miscibility but modifies the interfacial properties, also improves dispersion as well as performance of the finished material. In short, the equilibrium morphology depends on the free energy of the system as given by equilibrium thermodynamics.

The equilibrium morphology can be drastically modified by rheological means. At least three different (but related) mechanisms can be identified: (1) mechanical deformation of dispersed phase, as for example in an extensional flow field; (2) shear-stress-induced variation of the dynamic interfacial tension; and (3) flow-induced change of the free energy of the system, which may affect blend miscibility and upon cooling lead to either dispersed or interconnected morphology.

The possibilities of generation of nonequilibrium morphology can be commercially advantageous. Generation of polyamide fibrils in poly(ethylene terephthalate) matrix is known to improve the tensile and shrink properties of the fibers, even though the polymers are incompatible. Generation of lamellar polyamide morphology in polyolefins has a profound effect on permeability. The reinforcing effect of liquid crystal polymers in thermoplastic polyesters can have major effects in anisotropic applications. Several papers presented at the meeting and published in this symposium issues deal with these problems.

Nowadays, nearly all engineering resins are modified by blending. A desire for better processability, decrease of cost, and adjustment of properties provide strong motivation for blending. The 1984 world market for engineering alloys, blends, and composites was 1.4 Mt (3 billion lbs) or 14 percent of total plastics. With the three times higher growth rate and

the 3–4 times higher price than commodity resins, the engineering blends evolve into a major factor in plastics industry. Several papers in this issue contribute to the knowledge of these important materials.

This issue contains the second of two sets of symposium papers. The first was published in *Polym. Eng. Sci.*, Vol. 27, No. 5 (1987).

As organizer of "Polyblends-'86," I want to thank all the authors for their excellent contributions and Professor Roger S. Porter, the Editor of this Journal, for his hospitality and help in publishing the proceedings.

L. A. Utracki
Guest Editor