Chapter 5

Conclusions

Reactive compatibilization of immiscible polymer pairs, containing no suitable functional groups, can be achieved by physically imparting functionality to the constituent polymers with the addition of commercially available functional polymers, which is miscible with each of the constituent polymers, respectively. A multifunctional reactive coupler able to simultaneously react with both of the functional groups of the physically functionalized constituent polymers is required, if the two functional groups do not mutually react under the processing conditions. The strategy has been proven to be successful in reactive compatibilization of the immiscible PP/PS, Nylon/PPE and PP/mPPO blends and summarized below.

PP/PS blend

1. Reactive compatibilization can not be achieved unless PP and PS are both physically functionalized. A small quantity of the TGDDM is critical to function as a coupler in the PP/PS blend during melt blending.
2. FTIR analysis provides direct evidence of reactions of TGDDM with PP-g-MA and SMA during melt blending.
3. The PS domain size is significantly reduced for those compatibilized PP/PS

blends from the SEM graphs.

4. The crystallization temperature of PP in the compatibilized blends increases with decreasing PS domain size, whereas the melting temperature remains close to that of pure PP.

5. Tensile strength and flexural modulus of the compatibilized blends are substantially improved, compared to non compatibilized blends.

PA-6,6/PPE blend

1. The ultra low viscosity of the low molecular weight PPE significantly altered the viscosity mismatch between PA-6,6 and PPE, and the domain size was reduced accordingly.

2. The high hydroxyl end group of the low molecular weight PPE provides additional reaction site to the epoxy coupler, compared to the high molecular weight PPE

3. Without the existence of the low molecular weight PPE, the epoxy coupler tends to react solely with PA-6,6, as shown by the increased PA-6,6 T_g. On the other hand, addition of the low molecular weight PPE enables the epoxy coupler to react evenly with both components in the blend.

4. The fractured surface shows the bonding between the PA-6,6 and PPE was strengthened in the compatibilized blend. In addition, improvements in

mechanical properties were also found in the compatibilized blend.

PP/mPPO blend

1. The stress modulus data obtained from DMA measurements shows the onset of the drop of the flexural modulus to failure in compatibilized blends can be extended. In other words, the HDT of the compatibilized blends are higher than the uncompatibilized ones.
2. From the SEM pictures, the compatibilized blends also possess finer domain size, implying lower interfacial tension and broader interface between the blend components.
3. The multifunctional epoxy monomer TGDDM is better than the bi-functional epoxy monomer Epon828, in view of the domain size reduction.
4. The compatibilized blends have 10% to 20% greater flexural modulus and imcreased tensile strength.