

CHAPTER V

CONCLUSION

The addition of P(S-b-I-b-S) triblock copolymer to the interface between three immiscible HDPE/PI, PS/PI and PVAc/PI blends can greatly modified the size and size distribution because of steric hindrance and swelling between PS segment of block copolymer and matrix.

For studying the effect of shear rate and triblock copolymer, mixing the polymer blend to be homogeneous and has equilibrium morphology is necessary to do. We found that all blends used the strain unit, the product of shear rate multiplied by mixing time, which are approximately 6000 to reach the morphological equilibrium. At 0% SIS triblock copolymer, the morphology was studied as a function of shear rate by varying the shear rates between 10 to 200s⁻¹. The drop size decreased with increasing the shear rate due to the imbalance between the viscous force and the interfacial tension force. The slopes of three blends, HDPE/PI, PS/PI and PVAc/PI, were -1.12, -0.90 and -0.83, respectively, which is close to -1. It is consistent with Taylor (1937) and Wu's correlations (1987).

For the effect of triblock copolymer concentration on blend's morphology, the drop sizes were reduced with increasing the triblock copolymer concentration and the optimum concentration to saturate the surface of PI minor phase were 2 % after mixing and shearing at 10 s⁻¹ and 50 s⁻¹, respectively.

Finally, the effect of triblock copolymer as a function of shear rate was studied in two parts. The first part was the breakup experiment by step up of shear rate from 10 s⁻¹ to 100 s⁻¹ whereas the coalescence experiment was studied by step down of shear rate from 100 s⁻¹ to 10 s⁻¹. The results of both sections show the same results; SIS triblock copolymer can prevent the

coalescence at the different rates in all blends studied. PS/PI/5% SIS triblock copolymer exhibited the highest rate whereas PVAc/PI/5% SIS triblock copolymer has the lowest. This was because the swelling of PS-PS segment had higher value than that of PVAc-PS segment. So the steric hindrance for PS/PI system was larger than that of PVAc/PI system and in the former system it was more difficult for the collision and film drainage to occur. Moreover, we also found that triblock copolymer had a less influence on breakup behavior than coalescence behavior.