Preface

Polymer blending is an attractive method of creating new materials with more enhanced properties and greater performance than the homopolymers, especially since designing and synthesizing new polymers is time consuming and involves significant costs. It is well known that the blend properties can be affected significantly by polymer interfaces. Interfaces play an important role in polymer blends influencing the kinetics of phase separation which in turn controls the mixing, dispersion and morphology of the component phases of the polymer blend. Hence without the clear knowledge of polymer interfaces, it is not possible to combine the advantages of different polymers. This can be achieved by studying their interfaces in appropriate model systems.

The present study explores the different facets of interface characteristics, namely chain proximity distance ($\Delta s$) and diffused interface width ($\Delta l$) in dispersed polymer blends of three dimensional morphology. The chain proximity distance ($\Delta s$) in polymer blends is based on the simple connection between Stokes-Einstein equation for friction and the hydrodynamic interaction parameter ($\alpha$). The parameter $\alpha$ obtained from Ranganathaih method, through PLS measurement, quantifies the friction and the resulting energy dissipation at the polymer-polymer interface.

Diffused interface width, $\Delta l$ represents the thickness of the interface region that exists due to inter-diffusion of one of the constituent polymers into the domain of other constituent polymer of the blend. The $\Delta l$ determination is made possible from the derived empirical relation between hydrodynamic interaction parameter ($\alpha$) and the Flory-Huggins interaction parameter ($\chi$). Using this empirical relation and the self-consistent mean field theory of Helfand-Tagami, the composition density profiles across the interface are constructed for the binary blends under present study. The $\Delta l$ values were derived from these density profiles.

This thesis comprises of experimental results of the investigations carried out by the author on the blends namely SAN/PMMA, PVC/SAN, PS/PMMA, PP/HDPE, PVC/EVA, PVC/PS and SAN/EVA.