Chapter 5 Conclusions

In this thesis, we prepared various polymers with low polydispersity and controlled molecular weight, such as inorganic-organic polymer hybrids, linear homopolymers, star homopolymers and diblock copolymers by ATRP.

In the discussion of miscibility behavior and interactions of PHEMA/PVP blends and PHEMA-b-PVP diblock copolymers. The positive q values of the diblock copolymers and blends increase with the increase of molecular weight of PVP. FT-IR showed that inter-association interaction of the diblock copolymers was greater than that of the blends with the same composition. Measurements of the $T_{1\rho}^{H}$ reveal that each of the diblock copolymers and blends has one composition-dependent $T_{1\rho}^{H}$, indicating that both the diblock copolymers and blends are homogeneous on a scale of 1-3nm. Furthermore, the calculated domain sizes of the diblock copolymers are smaller than those of the corresponding blends.

In the discussion of miscibility behavior and interactions of linear and four-arm PtBA/ PBZZ blends. FT-IR showed that the hydrogen bonding interaction of the four-arm PtBA/ PBZZ blends is greater than the corresponding linear blends. Measurements of the $T_{1\rho}^{H}$ showed that all components of linear or four-arm PtBA/PBZZ blends were shown to separate into heterogeneous phases even through the material exhibits only a single broad T_g.

In the discussion of the influence of specific interactions of POSS-containing PMMA/phenolic blends. The positive q value of POSS-PMMA/phenolic blends and the negative q value of PMMA/phenolic blends decreases with the increase of molecular weight of PMMA. FT-IR and 2D IR show that inter-association interaction of POSS-PMMA/ phenolic blends was greater than PMMA/phenolic blends, indicating that the POSS segments of the POSS-PMMA affect the interaction between PMMA and phenolic resins at lower molecular weight of PMMA. As the molecular weight of PMMA is above its entanglement molecular weight, the contribution of POSS could be ignored.

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