



CHAPTER V

CONCLUSIONS AND RECOMENDATIONS

Two types of diamine based, i.e., ethylene diamine-based, and hexamethylene diamine-based benzoxazine dimers performed supramolecular polymeric system via hydrogen bond network and metal ion complexation. The length of diamine linkage of bifunctional benzoxazine dimers plays an important role in supramolecular polymer formation. In the case of metallo-supramolecular polymer, **2** clearly performed a complex with metal (II) perchlorate. The metallo-supramolecular system of **2** showed an increase in viscosity as well as the particle size in solution state. In addition, the metallo-supramolecular system of **2** also developed a needle-like morphology in solid state as observed in SEM and TEM indicating a self-assembly formation. In the case of hydrogen bond supramolecular polymer, implications about the increases in particle size, specific viscosity, and T1 relaxation related to the concentration indicated the possibility of hydrogen-bond supramolecular system of **2** and **4**. Considering the morphological development, it was found that **2** formed donut-like vesicle before changing to nanospheres as the concentration increased whereas **4** gave microcrystal powder which the morphology was needle- and comb-like structure as observed by SEM and TEM.

The present work originally shows a unique and novel supramolecular polymer of benzoxazine dimers which have diamine as the linkage between phenol units. The work should be extended to the studies on the factor of diamine chain length to the development of supramolecular polymer either via hydrogen bond network or metal complexation. The future work should also cover direct evidences of supramolecular polymer structure, especially single crystallographic analyses.