CHAPTER VIII
CONCLUSIONS AND RECOMMENDATIONS

The thermal conductivity of epoxy composite was successfully improved in this work by an enhancement of particle dispersion and particle surface modifications. Epoxy resin containing nano particles which can be easily dispersed in the matrix helped to improve thermal conductivity of the composite. Moreover, the improvement in thermal conductivity of the composite can be obtained by using optimum mixing conditions. Increases in the mixing speed, mixing time, and mixing temperature led to a decrease in particle size, an increase in the aspect ratio of the particles, and an increase in the particle size dispersity. These changes led to an increase in the thermal conductivity of the composite due to the increase in the surface area of the filler, the improvement in the packing efficiency and the homogeneity of the dispersion state, and the greater penetration of the polymer matrix into the filler aggregates.

The other effective approach to enhance thermal conductivity of the composite is by particle surface modifications. The thermal conductivity and mechanical properties of the composite can be significantly improved by admicellar polymerization. The BN surface treatment by admicellar polymerization was found to be more effective in improving the adhesion in BN-filled epoxy composite than the more conventional silane treatment.

It was found also that thermal conductivity of the composite could be improved by surfactant adsorption on the filler surface. The effect depended on the pH of the treating conditions, and the alkyl chain length of the surfactant.

In this work we have studied the thermal conductivity of epoxy composite at relatively low filler contents, below 40 vol%, and despite the improvement through the various methods under study, the highest thermal conductivity obtained in this work was still not too high. Hence, it will be interesting for future work to study the properties of composite at higher filler contents, above 50 vol%, to obtain composite with the highest possible thermal conductivity with optimum mechanical properties.