CHAPTER V

CONCLUSIONS AND RECOMMENDATION

Conclusions

1) The preparation of epoxy adhesives composites is the mixing system of epoxy matrix and thermal conductive fillers. The appropriate speed of stirrer is 200 rpm.

2) The thermal conductivities of epoxy adhesives filled with different types and percentages of fillers can determine by the guard hot plate technique which is a simple and reliable method for solid systems.

3) Two major variables which have an influence on thermal conductive values of prepared epoxy composites are types of fillers and percentage of fillers in epoxy matrix.

For this study, all added fillers like aluminium metal powder, berylium metal powder, copper metal powder, berylium oxide and silicon carbide can improve thermal conductivity of epoxy adhesive composites. The thermal

conductivity increases with increasing percentage of fillers as the linear equation of :

$$\log k = A x + \log k_o$$

when x varies from 0 to 20 % weight of filler and the values of A and log k_o of each composite are presented in Table 4.4.

It can conclude that the research for design and development of high thermal conductivity adhesives is that the percentage and type of the filler in the adhesive are of high importance. For some systems, the shape and arrangement of the filler particles in the adhesive are also of high importance.

4) From shear strength testing, all composites filled with the maximum percentage of filler, 20 % weight still show high adhesion strength.

5) The measured thermal conductivity has no significant change for the studied range of experimental temperature (25°C - 150°C).

6) It is known that no one correlation or technique accurately predicts the thermal conductivtiy of all types of composites. For this study, the

Ratcliffe model is useful to predict the thermal conductivity of high contrast epoxy adhesive composites, particularly, at low concentration of filler.

Recommendation

1) Another factor which should be considered for this development is the appearance of prepared adhesives. It should be proper and easy to apply on printed circuit board. Because one of three techniques for adhesive application, syringe dispenser, has the constraint of dispensing tip diameter, the appropriate fillers should have particle size around 5 to 10 micron in order to avoid adhesives being clogged in dispensing tip.

2) Because there are two type of adhesives that can use to attach chip on board, epoxy and acrylic adhesives, it should be possible to develop acrylic adhesive on thermal conductivity in the same way of this study.

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