CHAPTER V

CONCLUSIONS

There are three objectives in this study. The first objective is to synthesize the Al_2O_3-47wt%TiC composite powders via the combustion synthesis under microwave energy and conventional heating for comparison. The second objective is to study the possibilities of fabrication Al_2O_3-TiC composites prepared from combustion powders. Finally, the preliminary of microwave sintering of Al_2O_3-47%TiC combusted powders was examined. The conclusions have been drawn as follow:

1. The Al_2O_3-TiC powders were successfully synthesized under microwave energy in a very short time of less than 3 minutes, while conventional process is about 159-176 minutes.

2. In this present study, conventional sintering temperature of 1800^{o}C with the addition of MgO and Y_2O_3 additive is the proper sintering condition for the Al_2O_3-47%TiC combusted powders prepared from microwave and conventional heating.

3. The physical and mechanical properties of sintered microwave combusted powder were inferior as compared to the conventional ones. It might be a reason that conventional combustion took a longer time than microwave process.

4. Mechanical properties of sintered product can be controlled by its density and microstructure. High relative density and low apparent porosity resulted in good mechanical properties.

5. The improvement of the mechanical properties of composites can be manipulated by the TiC harder phase in term of initial particle size, distribution and also the ability to densify interconnected grain.

6. The highest density microwave sintered sample, prepared from microwave combusted powders, achieved was 82%TD at 1500°C under 2.4kW. The microwave

sintered sample had a tendency to obtain a nearly full densification at lower temperature compared to conventional process.

7. The gas-generating from reaction between Al_2O_3 and TiC can be suppressed in microwave sintering process due to fast sintering and short dwelling time.