CHAPTER V

CONCLUSIONS

IPP matrix melted mixing with 3% by weight of organoclay powder was extruded by twin screw extruder attached injection molding. The degree of clay dispersion was investigated by XRD. Organoclay induced the crystallization transformation of iPP matrix (changing from alpha to beta form) according to the XRD and DSC results. Furthermore, the XRD diffraction intensity peak of iPP/organoclay nanocomposite was sharper and higher than that of the iPP/GF composites and neat iPP. It indicated that the degree of crystallinity of iPP/organoclay nanocomposite was higher than that iPP/GF composite. The mechanical and thermal properties were also studied. The tensile modulus and yield strength of iPP matrix could be improved by the incorporation of organoclay but to the smaller extent in comparison with the incorporation with the glass fiber.

In the case of blended composites between iPP/GF composite and iPP/organoclay nanocomposite, it was found that the melt mixing process and the content of GF did not affect the distribution of layered silicates of the organoclay. The organoclay can still serve as a nucleating-agent for iPP crystallization. The degree of iPP crystallinity increased as the content of organoclay increased. The addition of organoclay also enhanced the rate of iPP crystallization as indicated by the increasing crystallization temperature.

Good interfacial interaction and high degree of crystallinity of iPP matrix led to the superior mechanical properties of blended composites. Tensile modulus of the blended composite is much higher than those of both iPP/GF composite and iPP/organoclay nanocomposite. Furthermore, the blended composites exhibited lower yield strength than that of the iPP/GF composite. However, increasing the content of organoclay decreases the tensile modulus, but did not affect the yield strength of the blended composites.

The outcome of this research suggests that the incorporation of organoclay as an additional reinforcement filler to iPP/GF composite not only can decrease the amount of GF used in the processing, but also yield the iPP composites with better tensile properties than the composites that were reinforced by either GF or organoclay alone. Furthermore, the same processing condition conventionally used in the industry can still be used for processing these iPP/GF/organoclay composites.

Suggestion for future research is to develop iPP/GF nanocomposites by an addition of organoclay as the second filler. It is also necessary to optimize processing conditions that can be used for large scale production in industries.