

## CHAPTER V

### CONCLUSIONS AND SUGGESTION

#### 5.1 Conclusions

Metallocene linear low-density polyethylene was blended with high-density polyethylene (HDPE/MLLDPE) for sheet which was used in vacuum thermoforming of pick up truck liner products. It can be manufactured by using the same processing condition as for the conventional HDPE. In spite of the immiscibility of MLLDPE blends with HDPE in amorphous phase but the degree of compatibility is larger for the MLLDPE system compared to the LLDPE, it is also valid in the polyolefin blends. Moreover, the DMTA and DSC measurements showed HDPE/MLLDPE blends are all miscible in the crystalline phase but immiscible in the amorphous phase. In addition, MLLDPE of three different manufacturers can be blended with HDPE which showed similar to mechanical properties and also sheet extrusion processability.

The mechanical properties of HDPE/MLLDPE blends for the pick up truck liner formed part varied with the blending content and the variations are distinct at over 30% MLLDPE content and less distinct at below 20% MLLDPE content. From the variations of the properties, distinct behaviors are identified in the dependence on the blending content. In addition, the coefficient of friction was improved which has anti-slip during the load carrying of pick up truck liner, when compared with conventional HDPE.

In the case of extrusion and thermoforming processability, it can be concluded that the processability of the pick up truck liner products are beneficial in this study and not affected by the use of MLLDPE. The MLLDPE has shown a unique combination of the mechanical properties. It changes the mechanical properties for the

balance and combination among processability, stiffness and toughness of pick up truck liner products.

The MLLDPE offers an excellent opportunity in applications where blends of conventional HDPE are currently used. MLLDPE is as strong as a conventional HDPE. There is great potential for downgauging which will benefit not only the converters, but also the consumers with environmental concerns and overall cost reduction needs.

## **5.2 Suggestion for further study**

1. Future research may consider HDPE/Thermoplastic elastomer blends for pick up truck liner.
2. Future study shall include feasibility studies on larger vacuum thermoforming part for truck liner.

ศูนย์วิทยทรัพยากร  
จุฬาลงกรณ์มหาวิทยาลัย