CHAPTER I
INTRODUCTION

Poly(trimethylene terephthalate) (PTT), a linear aromatic polyester was first synthesized by Whinfield and Dickson in 1941 (Rex *et al.*, 1949). PTT's properties are between poly(ethylene terephthalate) (PET) and poly(butylene terephthalate) (PBT) and it offers several advantageous properties. These are good strength and stiffness, good surface appearance, low shrinkage and warpage, good dimensional stability, outstanding elastic, recovery, and dyeability, which make it can use as applications such as carpets, textile fiber, automotive applications, or as an engineering plastic. However, it has low impact strength at low temperature which is the problems in the automotive applications (Run *et al.*, 2012). Thus, the modification of PTT with the other kind of polymers or polymer blend is one way to develop new material with excellence properties (Koning *et al.*, 1998), (Utracki, 2002). For the polymer blend systems, such as PTT/mPE (Jafari *et al.*, 2005), PTT/PP (Xue *et al.*, 2007, Xue *et al.*, 2007, Wang *et al.*, 2009), PTT/PET (Run *et al.*, 2009), PTT/PS (Huang, 2003), PTT/acrylonitrile–butadiene–styrene (ABS) (Xue *et al.*, 2007), and etc., improve their impact strength, crystallization, or other mechanical and physical properties. Polyethylene (PE) is the most widely used plastic throughout the world. It has several types such as high-density polyethylene (HDPE), *low-density polyethylene* (LDPE) and linear low density polyethylene (LLDPE). PE is easy to process, insensitive to moisture, good flexibility, good impact resistance, and relatively inexpensive (Sinthavathavorn *et al.*, 2008). Therefore, the blending of PTT with PE can combine the desirable characteristics of both materials and can enhance their properties such as strength, low temperature impact resistance, and high temperature capability which these are all importance for automotive applications.

Theoretically, PTT and PE blends are thermodynamically immiscible and mechanically incompatible which show a separation tendency, and lead to a coarse structure and low interfacial adhesion and result in poor mechanical properties of the final material. So, the directly mixed PTT/PE cannot serve as any useful product. Immiscible blends can be improved by adding a third component, which is an interfacially active polymer or a compatibilizer. It can improve physical and/or

chemical interactions between each polymer (Koning *et al.*, 1998), (Utracki, 2002). In this research, maleic anhydride grafted high-density polyethylene (MAH–g–HDPE) or Fusabond and ethylene-methacrylic acid neutralized sodium metal (Na-EMAA) or Surlyn were selected as compatibilizers for PTT/PE blends since they are widely used and easily available.

The aim of the this work is to study compatibilization effect of MAH-g-HDPE and Na-EMAA on the blends of PTT and PE. Characterization of mechanical, rheological, and morphological properties of obtained polmer blends will be also carried out.