CHAPTER I
INTRODUCTION

Crystallization of semicrystalline polymers is of great importance polymer processing due to the fact that the resulting physical properties are strongly dependent on the morphology formed and the extent of crystallization during processing. It is therefore very important to understand the processing-structure-property interrelationships of the studied materials. The crystallization of polymers is mainly controlled by nucleation and growth mechanism but the nucleation mechanisms play an important role in the crystallization of polymer either from solution or from melt. Nucleation mechanism can be categorized into two main processes as primary and secondary nucleation.

In actual processing of a semicrystalline polymer, primary nucleation mechanism and rate are characterized and controlled mainly by not only the presence of infusible heterogeneous nuclei (eg. catalysts residues, nucleating agents, impurities, etc.), but the processing history (viz. dictated by temperature, pressure, stress, etc.) as well. In processing conditions however, polymer melts are generally sheared (i.e., under shear flow) and stretched (i.e., under elongational flow). Crystallization therefore takes place in a moleculary oriented state within itself can enhance nucleation rate. This effect is referred to as 'orientational memory effect'. For the case of shear-induced crystallization, the kinetics are mainly influenced by material parameter and experiment conditions, of which temperature and shearing rates are the most importance. Numerous works have been carried out on the quiescent kinetics of isothermal and non-isothermal crystallization both cold and melt crystallization of poly(trimethylene terephthalate) (PTT), but hardly any reports on the effect of stress or shear on crystallization behavior of PTT. The objective of this work is to study the effect of shear on crystallization comparing with experimental results in the quiescent conditions and to better understand the stress-induced crystallization.