CHAPTER I
INTRODUCTION

Dental impression process—modeling process—is an important process for obtaining a patient's dentition, being used either to study oral anatomy of a person or to make a replication of teeth, gums, and vestibule.

The major problem in this process is that the standard sizes of the impression trays do not match with the jaws of some people, which impression in some cases cannot be done. To make an individual impression tray for each person may be the way to solve this problem, but the conventional metal trays are expensive and need to be cleaned and sterilized before reuse. The disposal trays are the other alternative choices due to inexpensive processing cost, but these trays can cause inaccuracies in the impression because of their flexibility, plastic memory and lack of rigidity.

Polylactic acid or polylactide (PLA) is a biocompatible and biodegradable thermoplastic, aliphatic polyester, which can be biodegraded within 4–5 weeks by heat, humidity and microorganisms (http://www.greenplastic.com), corresponding to the above application. The disadvantages of PLA are brittleness and low toughness, which can be modified by copolymerization or blending. Usually, blends of PLA lack of biocompatibility and biodegradability; therefore, copolymerization is the suitable method for modification. Copolymer of ethylene and vinyl acetate (EVA) was selected due to its biocompatibility and elastic properties, which can enhance mechanical properties of PLA.

The purpose of this work is to produce the bioplastic via catalytic reactive extrusion process, using an intermeshing co-rotating twin-screw extruder with various screw-rotating speeds, in order to investigate the suitable condition providing the maximum yield of EVA-g-PLA copolymers. Moreover, thermal and mechanical properties of the EVA-g-PLA bioplastic are determined.