

# CHAPTER I

## INTRODUCTION

### 1.1 Scientific rationale

Electrophotography technology is applied for printers and copiers that are very widely used for both high and medium quality of printers. The machines and materials for this system have been continually developed. Concerning the electrophotographic materials, the triboelectric properties of a two-component developer are important in practical machines. By these reasons, toner characterizations which depend on toner charge are a very important factor for the developer design in commercial copiers and printers.

From the research [1-2], it was shown that the polymerized toners have many superior properties than conventional pulverized toners. It is a simpler production process with a more narrow particle size distribution, higher flowability and transfer ratio, which has better quality of printed images and lower fusing temperature compared with encapsulated toners. On the other hand, there are many factors that affect the toner triboelectric properties such as types of carrier, component of toner and toner concentration. This research investigates the effects of carrier types, toner concentration and mixing method on toner charging and print quality.

## 1.2 Objectives of the research

1.2.1 To study the effect of carrier types, toner concentration and mixing method on toner charging

1.2.2 To evaluate the print quality of the print-outs using the polymerized toner and pulverized toner

## 1.3 Scope of the research

This research involves measurement and characterization of four types of toners (cyan, magenta, yellow and black toner) on the carriers of TSV-200, F-150 and Z-250. The  $q/m$  and the charging time are studied by various toner concentrations, carrier types, and mixing method that are the vertical mixing and the horizontal mixing. Their  $q/m$  values are measured by blow-off method. The average size and size distribution of the toner are studied using scanning electron microscopy (SEM) and electrical single particle aerodynamic relaxation time (E-SPART) analyzer.

The print-outs, which are produced from a test form, are printed by a Canon printer, use the polymerized toner and compared with a Fuji printer (model), use the pulverized toner in order to evaluate the print quality. The print quality of print-outs is measured for solid density and tone reproduction with a reflection densitometer. The sharpness of the lines and the characters is determined by an image analyzer. The color gamut and gamut volume are measured by a spectrophotometer.

The result of this research may lead to improvement of the toner manufacturing for electrophotographic printing.

#### **1.4 Content of the research**

This thesis consists of 5 chapters (introduction, theory and literature review, experimental, results and discussion, and conclusions). Chapter 2 presents a brief history of electrophotography, the electrophotographic process, toner components, toner characterization, the charge measurement methods, the two-component development, polymerized toner and literature review. Chapter 3 displays the details about the materials, apparatus, and the experimental procedure. Chapter 4 describes the results and discussions of the dependency of  $q/m$  on the toner concentration, carrier types, mixing method and print qualities.



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