

UNIVERSITI TEKNOLOGI MARA

**STUDY ON SYNTHESIS OF CARBON DOTS USING CARBON
SOOT AND ACTIVATED CHARCOAL**

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ABSTRACT

Nanoparticles have gained huge attention in many application fields. The current type of nanoparticles used is expensive such as gold nanoparticles. Carbon based materials are more preferable than gold in synthesizing the nanoparticles because it is cheap with unlimited resources. Fluorescent carbon nanoparticles were synthesized via nitric acid oxidation from two different sources which were from carbon soot and activated charcoal. The nitric acid oxidation process made the carbon molecules became smaller and more water soluble. The incorporation of nitrogen and oxygen into carbon molecules after the reflux process resulted in light emitting property of carbon nanoparticles. These carbon nanoparticles showed green fluorescence under UV exposure. The light emitted by these carbon nanoparticles depends on the wavelength of light used for excitation. The samples were analysed using ultraviolet-visible absorption and fluorescence intensity to prove that the carbon nanoparticles were successfully synthesized in this study. The consistent results with the published literature suggested that the samples obtained in this experiment contains carbon nanoparticle.

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CHAPTER ONE

INTRODUCTION

1.1 Carbon dots

Carbon dots (CDs) are defined as carbon-based structure of nanoparticle that exhibit fluorescent properties. Other than CDs, there are many types of nanoparticles that are produced nowadays such as liposome, silicon-based structure and metal structure of nanoparticles [1]. Generally, carbon dot is one of the nanoparticles that had gained huge attentions due to its unique characteristics such as non-toxic, high water soluble and able to emit fluorescent [2]. The nanoparticles and bulk material do have several differences due to surface effect and quantum effects [3]. The surface effects will cause the nanoparticles to have smooth properties scaling due to the fraction of atoms at the surface. The quantum effects caused the nanoparticle to show discontinuous behaviour due to delocalized electron. Nanoparticles have higher surface area rendering them to have higher reactivity compared to the bulk material.

Nanoparticles can be easily functionalized or passivated because of this unique property. The carbon nanoparticles became more fluorescent when they are subjected with polymer passivation and nitric acid treatment [4]. CD is considered as one of the most potential nanoparticles that can be used in many applications in the future. The low cost