UNIVERSITI TEKNOLOGI MARA

SYNTHESIS OF CARBON DOTS BY ACID DEHYDRATION OF CARBOHYDRATE AND ACTIVATED CHARCOAL

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ABSTRACT

Recently, carbon dots has gained numerous attention due to their remarkable fluorescence properties, potential in bioimaging, high stability over time, non-photobleaching and low toxicity. This project is focused on the use of sago starch and activated charcoal to synthesize carbon dots. The resultant carbon dots were analyzed using different spectroscopic techniques such as UV-visible spectroscopy and fluorescence spectroscopy. Our experimental results showed that, carbon dots synthesized from sago gave a successfully produced fluorescent emission at the 478 nm with optimum excitation wavelength of 380 nm. On the other hand, carbon dots synthesized from activated charcoal gave a fluorescence emission at 425 nm upon excitation at 310 nm. The samples when tested under UV lamp at wavelength of 254 nm emit light green fluorescence.

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CHAPTER 1

INTRODUCTION

1.1 Background of study

During the last decade, significant interest has arisen in the research of nanoparticles particularly for biomedical applications. The incorporation of nanotechnology into the field of medical science has opened new possibilities especially for the treatment of diseases which were previously difficult to target due to size restrictions [1]. Huang *et al.* (2011) reported that inorganic nanoparticles such as gold, semiconductor fluorescent quantum dots, carbon nanotubes, magnetic, and ceramic nanoparticles have demonstrated successes in imaging and treatment of tumors in vivo, with some promise towards clinical trials. However, the are some major concerns that limit their application such as toxicity of cadmium in quantum dots and high rates of carbon nanotubes accumulation in liver and kidney [2].

In contrast, carbon dots which is less toxic and has similar properties like quantum dots shows high potential in biological imaging, biological labelling and other applications [3]. Although this new class of fluorescent nanoparticles was recently discovered, it has attracted great attention due to their intense fluorescence emission and excitation, possess high stability over time, non- photobleaching, resistant to chemical degradation, high quantum yields, and large Stokes shifts [4].