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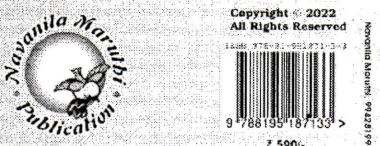

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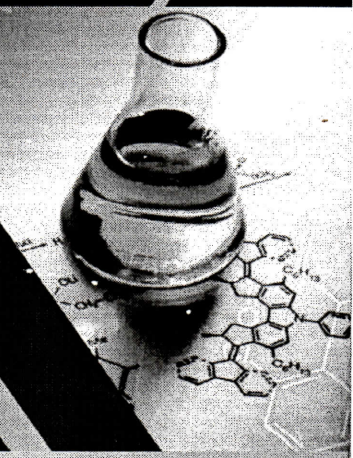

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Green Synthesis of Carbon Quantum Dots from *Muntingia calabura* Leaves and *Pithecellobium dulce* Fruit Pods and its Antibacterial Activity

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Abstract — *Novel carbon dots that are water-soluble in nature were synthesized via a facile and green synthetic process. Carbon dots (C-dots) are fluorescent nanomaterials good in photo stability and low toxic. For a variety of biological species, they have been used as sensing probes and bio imaging agents. Hydrothermal method was an effective method used for preparation of product with preferable growth. In this concept, we focused to develop a systematic way of synthesized Carbon Dots from Muntingia calabura leaves and Pithecellobium dulce fruit pods. The as prepared Carbon Quantum Dots were analyzed using SEM, Photoluminescence, UV-Visible spectroscopy, 3D Optical Profilometer, FT-IR Spectroscopy. Infrared absorption spectra on the surface of synthesized carbon dots revealed the presence of oxygen groups. These CDs effectively worked as excellent antibacterial as well as photo catalyzed nanomaterials. Under UV irradiation with fluorescent, the as-synthesized C-dots emit a strong green light quantum yield of 48 percent, and the emission wavelength was red-shifted under excitation with longer wavelengths in aqueous solution. As synthesized carbon dots provided as fluorescent exploration for imaging fungus cells and bacteria explaining that C-dots were good compatible and nontoxic which signify the potentials for both in vitro and in vivo applications.*

Keywords — *Carbon Dots, green synthesis, fluorescent, anti-bacterial studies.*

Introduction

CDs are a type of zero-dimensional carbon structure that contains sp2 bonds between carbon atoms and various functional groups. Carbon dots helps in the replacement of the conventional semiconducting Quantum Dots (QDs) for an important mainstream medicine area due to its excellent photoluminescence property and small size. It is widely used in the application of biomedical area, use of non- toxic carbon precursors plays a vital role in the incorporation of carbon dots [1- 4]. Carbon dots exhibits tremendous application for in vitro and in vivo imaging of target analyte on comparing of organic dyes and semiconductor QDs. For preparation of C-dots, number of synthetic methods had been developed; electrochemical oxidation and laser ablation, bottom-up methods of microwaveassisted synthesis, combustion thermal oxidation and hydrothermal synthetic route. Among various methods of synthesis, hydrothermal technique has proved as one of the uncomplicated and green chemical process to prepare water dispersible CDs using natural resources as precursors [5]. Top down method was based on carbonization technique to form C-dots particle and bottom up method using molecule precursors that were along with polymerization of monomer, pyrolysis, respectively [6]. N- Doping can adequately strain the intrinsic properties of Carbon Dots, containing their electrochemical properties, surface gravity and surface reactivity [7].

Synthesis of Carbon dots

Muntingia calabura leaves and Pithecellobium dulce fruit pod were collected from nearby farm and authenticated by department of botany of our university. Obtained leaves were cleaned with deionized water to detach dust particles and were dehydrated at 250C. The dried leaves were