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LUMINESCENCECARBON NANOPARTICLES FROM SOOT

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ABSTRACT

Carbon nanoparticles (CNPs) were extracted from kerosene; diesel and petrol soot using a medium containing a mixture of acetone and water. TheCNPs showed green and blue luminescence under 365nm UV light and were further characterized using SEM, UV-visible spectroscopy and FT-IR. The UV-visible spectra of the CNPs showed absorption maxima corresponding to blue shift and also attributable to non-uniform distribution. The SEM indicated that the CNPs occurred in aggregate structure with average size estimated to be about 40 nm. The FT-IR showed the presence of pure carbon without evidence of any functionalization.

Keywords: *CNPs, Kerosene, Soot, SEM, Luminescence,*

1. INTRODUCTION

Carbon is one of the most abundant elements in nature. A broad range of carbon nanostructureshave attracted interest such as carbon nanotubes, fullerenes,nanofibers, nanodiamond, carbon nanoonions, and othercarbonaceous nanomaterials. Carbon nanostructures have displayed excellent applications because of their unique chemicaland physical properties resulting in materials with reduced weight, high impact strength, high surface area per unit volume,good electrical conductivity, optical properties, thermal stability, flame resistance and good dimensional stability (Han *et al.*, 2009; Pradeep, 2007).

In biological science, carbon based nanomaterialshave been utilized as excellent platforms for facilitating biochemicalreactions and processes, such as sensitive recognitionof antibodies, sequencing of nucleic acids, bioseparation,and biocatalysis (Ray *et al.,* 2009; Chen and Roco, 2009). Despite the wide range of emerging applications there is still a dearth of information on the health impacts of nanoparticles.

Carbon nanostructures have been obtained by methods such as thermal carbonization, sonication, laser irradiation and exfoliation (Shenderova*et al*., 2002; Akiyama *eta.l,* 2004; Li *et al.*, 2011). Carbon sources as precursor for the nanostructures include chemical vapour deposition of coal (Kapil*et al.*, 2012) and scrap tyre rubber (Yang *et al.,* 2012), arc-discharge and thermal plasma jet (Ying *et al.*, 2011), catalytic decomposition of ethanol (Gallego*et al.*, 2011). Others include hydrocarbon gases (Baker, 2011) over selected metal particles such as; iron, cobalt, nickel, and their alloys at temperatures over the range 400 to 1000°C. Although both arc-discharge and thermal plasma jet produces high quality carbon nanoparticles they are not sustainable for large-scale synthesis (Ying *et al.*, 2011).

Herein, we report thesynthesis of carbon nanoparticles from kerosene, petrol and diesel based soot as a simple, low-costmethod. The properties of the CNPs were investigated using UV-