



## Synthesis and Characterization of Composite Nanomaterials for Photonic Application

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**Abstract.** Here we presented composite nanomaterials especially for the photonic device applications. Presented nanoparticles were synthesized using agricultural waste (as precursor) which drastically reduces the production cost. In the same time it can utilize the usage of agricultural biomass and prevent the environmental impact to occur. The composite nanomaterial is synthesized using pyrolysis method and further been characterized using Fourier Transform Infrared Spectroscopy (FTIR), X-ray Diffraction (XRD), FESEM-EDX and Transmission Electron Microscopy (TEM). The XRD results revealed the presence of carbon and iron particles where it can be clearly stated in the FESEM-EDX results showed the high percentage of carbon and iron. Besides that, the FESEM and TEM images showed that the particles are existed in nano sizes.

**Keywords.** Agricultural waste (oil palm waste), Composite nanomaterial and photonic.

### 1. INTRODUCTION

Ever since its discovery, materials of nano size attracted lot of attention due to its ever-growing applications from health sector to energy to oil and gas etc. Nanomaterials have various types such as nanoparticles, nanotubes and nanofilms.

Nanomaterials have many industrial applications either in biological field, environmental control, photonic and many more.

Besides that carbon nanoparticles have many demand due to the variety of properties that can be used in many type of applications in various field. It is having many properties such as high impact strength, high surface area, optical properties, thermal stability and electrical conductivity. Carbon nanoparticles also have demand in nanotechnology where it can be applied in wide areas such in optical devices, antimicrobial agents and pollution prevention materials. In biology field, it also can be used as antibodies recognition, nucleic acid sequencing and also in bioseparation and biocatalysis. As the nanotechnology field is new research area, the nanostructured materials such as carbon nanoparticles can be applied in medical and pharmaceutical field, since decrease in nano particles size will increase the antimicrobial activity due to the larger surface area per unit volume and it will easily destroy the microorganisms cell wall. This combination between the nanotechnology and microbiology will have great potential in curing the diseases [?].

