

# Multifunctional Water Soluble Carbon Nano Onions from Flaxseed Oil for Visible Light Induced Photocatalytic Applications and Label Free Detection of Al(III) Ions

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## Abstract

CNOs are a new group of ultra-small carbon nano structures with unique physiochemical properties due to pronounced quantum confinement and edge effects and a one of the fastest moving and most exciting nanotechnologies research concern.<sup>1,2</sup> Onion-like carbon nanoparticles (CNOs) were synthesized via traditional pyrolysis of flaxseed oil. Oxidative treatment of as-synthesized carbon soot introduced numerous carboxyl (-COOH) functionalities, rendering them hydrophilic and stable in aqueous phase. The water-soluble onion-like carbon nanoparticles (wsCNOs) were 4-8 nm in size and exhibited stable green photoluminescence (PL) emission. CNOs were explored as efficient photocatalysts for the degradation of methylene blue (MB) as model organic pollutant dye under visible light irradiation. The wsCNOs exhibited photocatalytic efficiency ~9 times higher than CNOs for MB degradation. Enhanced photocatalytic efficiency of wsCNOs was attributed to their surface functionalities and nanostructure. The unique morphology (concentric nanographene shells) with considerable surface defects, increased the physisorption of MB on the wsCNOs surface and significantly enhanced the photocatalytic efficiency of wsCNOs. Furthermore, the wsCNOs enabled specific detection of Al(III), even with interference from high concentrations of other metal ions, with a detection limit of 0.77  $\mu\text{M}$ , which compares favorably to other reported fluorescent probe. Altogether, the wsCNOs showed a significantly enhanced photocatalytic activity and were used as highly selective fluorescent probes for Al(III) ion detection, suggesting a potential use in environmental wastewater treatment. In addition, Flaxseed oil soot can be an ideal building block and open up new window for the fabrication of

composite material for multifunctional applications.<sup>2,3</sup>

## References

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## Figure

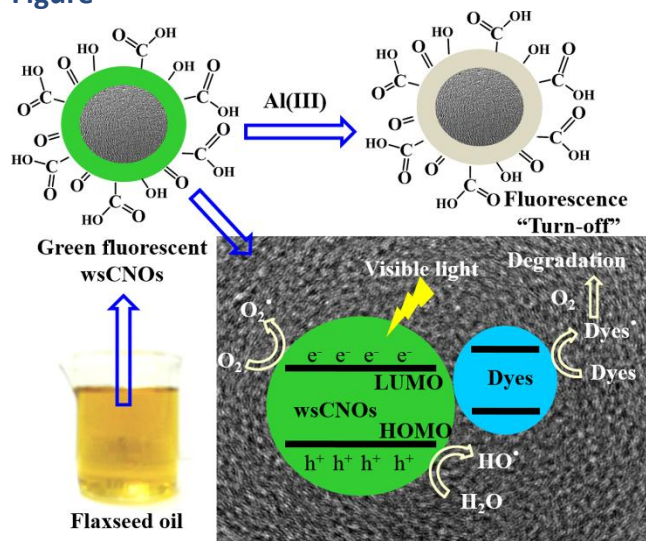


Figure 1. A schematic representation for the synthesis and multifunctional application of water soluble green fluorescent carbon nano onions.