Functionalized Carbon-Base Fluorescent Nanoparticles for Emerging Contaminants Targeted Analysis

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Abstract : The rise in consumerism over the past century has resulted in the creation of higher amounts of plasticizers, personal care products and other chemical substances, which enter and accumulate in water systems. Other sources of pollutants in Neotropical regions experience large inputs of nutrients with these pollutants resulting in eutrophication of water which consume large quantities of oxygen, resulting in high fish mortality. This dilemma has created a need for the development of targeted detection in complex matrices and remediation of emerging contaminants. We have synthesized carbon nanoparticles from macro algae (Ulva fasciata) by oxidizing the graphitic carbon network under extreme acidic conditions. The resulting material was characterized by STEM, yielding a spherical 12 nm average diameter nanoparticles, which can be fixed into a polysaccharide aerogel synthesized from the same macro algae. Spectrophotometer analyses show a pH dependent fluorescent behavior varying from 450-620 nm in aqueous media. Heavily oxidized edges provide for easy functionalization with enzymes for a more targeted analysis and remediation technique. Given the optical properties of the carbon base nanoparticles and the numerous possibilities of functionalization, we have developed a selective and robust targeted bio-detection and bioremediation technique for the treatment of emerging contaminants in complex matrices like estuarine embayment.

Keywords : aerogels, carbon nanoparticles, fluorescent, targeted analysis

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