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Nanotech 2018: Synthesis of iron oxide nanoparticles by green chemistry using Cymbopogon extract for antibacterial and eco-toxicity evaluations- David Patino Ruiz, Universidad de Cartagena, Colombia

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In the previous couple of years, nanotechnology has been the main target of the many investigations thanks to their nanoscale typical properties with a good range of applications within the electrical, biomedical, biological, chemical and pharmaceutical fields. it's found that iron oxide nanoparticles have an excellent interest due to its important role in technological application and, especially has established a promising within the biological and biomedical fields. These nanoparticles have unique physicochemical properties and capabilities allowing the cellular and molecular interactions within the living organisms and ecosystems, and during this context, some studies could also be considered regarding the evaluation of toxic effects which will be led with the utilization of iron oxide nanoparticles. Taking under consideration the present and wide applications of those nanoparticles, methodologies of synthesis like co-precipitation, thermal decomposition, hydrothermal, among others, have developed concerns about the impacts produced to the environment and therefore the high consumption of energy, reactants, and other resources. Therefore, a green synthesis for nanomaterials preparation has emerged so as to get an equivalent products with an eco-friendly and safe process route, during which natural resources and wastes are used for this purpose. Herein, we present a green chemistry approach for iron oxides nanoparticles synthesis using Cymbopogon aqueous extract as a reducer . The synthesized nanoparticles were characterized using XPS, TEM, VSM, IR, TGA and XRD analysis. Besides, the iron oxide nanoparticles properties were evaluated through antibacterial and eco-toxicity tests, using E. coli and C. elegans respectively.

Iron-based nanoparticles (FeNPs) are used successfully in water treatment and environmental cleanup efforts. This study examined ecotoxicity of two FeNPs produced with extract from tea (smGT, GTFe) and their ability to degrade malachite green (MG). Their physicochemical properties were assessed by transmission microscopy , X-ray powder diffraction, dynamic light scattering, and transmission Mössbauer spectroscopy. employing a battery of ecotoxicological bioassays, we determined the toxicity for nine different organisms, including bacteria, cyanobacteria, algae, plants, and crustaceans. Iron and iron oxide nanoparticles synthesized with tea extract displayed low capacity to degrade MG and were toxic to all or any tested organisms.

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