METAL OXIDE- CHITOSAN NANOCOMPOSITES FOR EFFICIENT AND SMART FERTILIZATION

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Environmental contamination has become a challenging issue because of the uncontrolled use of synthetic agrochemicals for plant growth. In order to reduce the soil waste and the inefficient fertilization, scientific interest is recently devoted to develop nanoparticles as alternative fertilizers[1]. Nanoparticles can vehicle fertilizers allowing their enhanced and prolonged delivery to or uptake by plants, moreover, they are biologically active themselves owing to their highly reactive surface. In our work, we realize innovative smart nanocomposites, based on metal oxide nanoparticles (MeO NPs) coated with chitosan, by an environmentally friendly chemical preparation. As MeO NPs we have chosen Copper Oxide and Cerium Oxide NPs, because they are more efficient than bulk materials in the photosynthesis and production of metabolites of many plants[2,3]. Chitosan has been selected since its well-known antimicrobial, antimycotic and biostimulant activities in plants[4]. Furthermore, the use of chitosan as a coating agent of the MeO NPs will allow a smart release of fertilizer that will be triggered in response to the environmental condition, such as pH. We will show the reached accurate control of the density and size of the synthesized nanocomposites, as demonstrated by structural and optical investigation. In particular, the morphology and size distribution is studied by Scanning Electron Microscopy and Dynamic Light Scattering. The nature of the MeO NPs core will be further analyzed by UV-vis absorption and by photoluminescence. Moreover, we will take into account the release properties over time mediated by polymer degradation, induced by proper stimuli. This approach has great potentiality for applications in developing agrochemical carrier and pesticides delivery.

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