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Extended Abstract

Biosynthesis of Selenium Nanoparticles Supported on and within Diatomite through a Continuous Flow Method †

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Diatomite, also known as diatomaceous earth (DE), is a sedimentary rock formed by the deposition of shells of unicellular microscopic algae of the class *Bacillariophyceae* (diatoms). Diatomite-based products are recognized for their significant insect-fungicidal activities and are used in agriculture as soil improver and for the protection of the aerial parts of crops. Additionally, diatomite products are characterized by a naturally intricate and highly porous structure composition [1]. Selenium (Se) is a functional element for all living organisms. Selenium nanoparticles (SeNPs) have various biological properties, being antioxidant and antimicrobial, with applications in diverse industrial fields [2]. The main aim of this work was the bioassisted synthesis of SeNPs within the porous structure of diatomite by a continuous flow method. SeNPs were synthesised by the use of plant extracts as an agent to reduce Se from sodium selenite (Na_2SeO_3) to elemental Se, in the porous matrix of diatomite. The plant extract was obtained by mechanical extraction with a ball mill. The antioxidant activity (AOA) of the extract was analysed by DPPH and FRAP methods. The phenolic compounds of the extract were determined by HPLC. The extract was recirculated dropwise through a column with diatomite overnight, after which the remaining extract was removed and 10 mM selenite solution was added and recirculated in a continuous stream dropwise for 24 h. SeNPs were also prepared in batch as a control sample by the dropwise addition of Na_2SeO_3 into the plant extract under continuous magnetic stirring. The samples of SeNPs within and outside the diatomite were analyzed by TEM. Our preliminary results indicate that the plant extract has the necessary antioxidant properties to reduce Se from Na_2SeO_3 to obtain SeNPs. TEM analysis indicated the formation of SeNPs both inside and outside the diatomite. The inside NPs should result in a more controlled release of bioactive Se. We developed a continuous flow method for the in situ bioassisted synthesis of SeNPs within diatomite pores using plant extracts.

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