



Selenium uptake and assessment of the biochemical changes in *Arthrospira (Spirulina) platensis* biomass during the synthesis of selenium nanoparticles

**I. Zinicovscaia, T. Chiriac, L. Cepoi, L. Rudi, O. Culicov,
M. Frontasyeva, V. Rudic**

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Abstract

The process of selenium uptake by biomass of the cyanobacterium *Arthrospira (Spirulina) platensis* was investigated by neutron activation analysis at different selenium concentrations in solution and at different contact times. Experimental data showed good fit with the Freundlich adsorption isotherm model, with a regression coefficient value of 0.99. In terms of absorption dependence on time, the maximal selenium content was adsorbed in the first 5 min of interaction without significant further changes. It was also found that *A. platensis* biomass forms spherical selenium nanoparticles. Biochemical analysis was used to assess the changes in the main components of spirulina biomass (proteins, lipids, carbohydrates, and phycobilin) during nanoparticle formation.

Keywords: biosorption, biochemical changes, nanoparticles, selenium, Arthrospira (Spirulina) platensis, neutron activation analysis, scanning electron microscopy

Résumé

On a examiné le processus de captation du sélénium par une biomasse de cyanobactéries *Arthrospira (Spirulina) platensis* au moyen d'une analyse par activation neutronique suivant diverses concentrations de sélénium en solution et divers temps de contact. Les données obtenues se sont bien agencées avec un modèle isotherme d'adsorption de Freundlich présentant un coefficient de régression de 0,99. Eu égard à la dépendance temporelle de l'absorption, la quantité maximale de sélénium a été adsorbée dans les 5 premières minutes d'interaction sans changement notable par la suite. On a également constaté que la biomasse d'*A. platensis* forme des nanoparticules sphériques de



sélénium. On a procédé à une analyse biochimique afin d'évaluer les variations des principaux constituants de la biomasse de la spiruline (protéines, lipides, glucides et phycobiline) au cours de la formation des nanoparticules.

Keywords: biosorption, changements biochimiques, nanoparticules, selenium, Arthrospira (Spirulina) platensis, analyse par activation neutronique, microscopie électronique à balayage

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