

# **Cyanobacteria *Arthrospira platensis* as an Effective Tool for Gadolinium Removal from Wastewater**

Yushin N.<sup>1,2</sup>, Zinicovscaia I.<sup>1,3</sup>, Cepoi L.<sup>4</sup>, Chiriac T.<sup>4</sup>, Rudi L.<sup>4</sup>, Grozdov D.<sup>1</sup>

<sup>1</sup>*Frank Laboratory of Neutron Physics, JINR, IIO, Dubna*

<sup>2</sup>*Doctoral School of Biological, Geonomic, Chemical and Technological Sciences, State University of Moldova, 2009 Chisinau, Moldova*

<sup>3</sup>*Horia Hulubei National Institute for R&D in Physics and Nuclear Engineering, Bucharest-Magurele, MG-6, 077125 Bucharest, Romania*

<sup>4</sup>*Institute of Microbiology and Biotechnology, Technical University of Moldova, 2028 Chisinau, Moldova*

For the first time, cyanobacteria, namely *Arthrospira platensis*, were applied for biosorption and bioaccumulation of gadolinium ions from batch solutions. In biosorption experiments, the effect of the most important parameters, such as gadolinium concentration, time, pH and temperature, on the biomass biosorption capacity was investigated. The maximum biosorption of gadolinium of 101 mg/g was achieved at pH 3.0 and temperature of 20 °C, and it was significantly higher than the values reported in the literature. Gadolinium removal was shown to be a very quick process – three minutes were enough for maximum metal removal. The kinetics of the biosorption was better described by pseudo-first-order kinetic model, while equilibrium data were better presented by the Freundlich model, suggesting biosorption on the heterogeneous surface. From a thermodynamic point of view, the process of gadolinium biosorption was spontaneous and exothermic in nature. In the bioaccumulation experiments, gadolinium ions were almost completely accumulated from the cultivation medium and stimulated biomass growth. The obtained data showed that cyanobacteria *Arthrospira platensis* can be applied for gadolinium removal from wastewater through biosorption and/or bioaccumulation processes.