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"Gheorghe Asachi" Technical University of Iasi, Romania

MAGNETIC CONTAMINATION OF ENVIRONMENT – LABORATORY SIMULATION OF MIXED IRON OXIDES IMPACT ON MICROORGANISM CELLS

Lacramioara Oprica[1], Claudia Nadejde[2], Maria Andries[2], Emil Puscasu[2], Dorina Creanga[2*], Maria Balasoiu[3]

[1]*"Alexandru Ioan Cuza" University, Faculty of Biology, 20 Blvd. Carol I, Iasi, Romania*
[2]*"Alexandru Ioan Cuza" University, Faculty of Physics, 11 Blvd. Carol I, Iasi, Romania*
[3]*Institute of Nuclear Research, Dubna, Russian Federation*

Abstract

Magnetic contamination is considered more and more as a challenging issue related to biosphere pollution with magnetic materials originating in natural and artificial sources (volcanic eruptions and respectively industrial activities that contributed to iron and other metal compounds spreading in air, water and soil). Aiming to study the impact of magnetic metal ions such as iron and cobalt on the metabolism of some environmental microorganisms, in this paper an experimental simulation of magnetic contamination was carried out based on mixed iron/cobalt oxides as source of ions. Magnetic nanoparticles were prepared following chemical route with appropriately adjusting of their surface to ensure uniform dispersion in water. Typical crystalline structure of studied nanoparticles was evidenced with X-ray diffraction, while microstructural and magnetic properties were investigated by scanning electron microscopy and respectively vibrating sample magnetometry. Increased level of peroxidase activity in a fungus mycelium has suggested microorganism adaptation to higher levels of reactive oxygen species following the supply with magnetic nanoparticles suspensions (0-10-20-30-35 mg/L, comparable with detected levels of iron in the living organism). Lipid peroxidation was evidenced also; being assigned to the increased level of hydrogen peroxide that catalase seems enable to balance - as resulted from its decreasing activity. The variations of analyzed indicators of oxidative stress were of no more than 15%, reflecting organism adaptation to environmental constraints but also possible damages of cell membrane system.

Key words: cobalt, iron, oxidative stress markers, *Phanerochaete chrysosporium*

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[*] Author to whom all correspondence should be addressed: e-mail: mdor@uaic.ro; Phone: 040232201064; Fax: 040232201150