6th International Conference on Nanotechnologies and Biomedical Engineering Proceedings of ICNBME-2023, September 20–23, 2023, Chisinau, Moldova - Volume 1: Nanotechnologies and Nano-biomaterials for Applications in Medicine

Preservation of Microorganisms of Biotechnological Interest Involving Fe_2O_3, Fe_2ZnO_4, and ZnO Nanoparticles

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https://doi.org/10.1007/978-3-031-42775-6_49

Abstract

Microorganisms are inexhaustible and advantageous sources of bioactive substances, which is why they are widely used in biotechnology. The in-depth study of the interactions between microorganisms and nanomaterials opens new ways to improve the biosynthetic properties of microorganisms of biotechnological interest for their application in various technological fields. The use of nanoparticles in the process of cultivating microorganisms that have a beneficial effect on their biosynthetic properties facilitates obtaining valuable bioactive substances, as well as contributing to maintaining stable biosynthetic properties in the process of conservation and long-term storage. The effect of nanoparticles on the biosynthetic activity of microorganisms varies depending on the chemical composition, size, morphology and concentration of the particles, as well as on the physiological-biochemical particularities of the culture. In the process of lyophilization of microorganisms, numerous factors cause the appearance of various problems related to the safety of the initial properties of strains of microorganisms of biotechnological interest. The results of the research presented in this material, carried out on the basis of micromycetes of the genus *Trichoderma* and the genus *Penicillium*, demonstrate that the involvement of Fe_2O_3, Fe_2ZnO_4, ZnO nanoparticles in the preservation process by the lyophilization method can contribute to the stimulation of the strains' sensitivity to some phytopathogens. Thus, the application of nanomaterials in the process of long-term conservation of microorganisms of biotechnological interest, with the subsequent involvement of crops in obtaining biopreparations for agricultural use, contributes to increasing their efficiency in combating phytopathogens and obtaining ecological products.

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Keywords: micromycetes, zinc oxide nanoparticles, microorganisms, lyophilization, lyoprotective

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