Reviews on Advanced Materials and Technologies, 2025, vol. 7, no. 2, pp. 114–123
DOI: 10.17586/2687-0568-2025-7-2-114-123

Comparative Effects of Ionic and Nanoparticulate Silver on Nematodes *C. elegans* and Mice

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Abstract. The increasing use of silver nanoparticles (SNPs) in various fields of human activity concerns about their potential toxicity, particularly for invertebrates that absorb substances through their body surface and for terrestrial mammals. This study focuses on the interference of abiogenic silver with copper metabolism. This is due to the fact that Ag^{1+} and Cu^{1+} are isoelectronic, silver ions can be recognized by copper transporters and erroneously incorporated into essential cuproenzymes, thereby impairing their function. We conducted a comparative analysis of the biological effects of ionic silver (from $AgNO_3$) and nanoparticulate silver (30–40 nm spherical SNPs) on both wild-type *Caenorhabditis elegans* and a mutant strain with impaired copper excretion, as well as on the copper status in the serum of laboratory mice. The results revealed that SNPs exert greater toxicity in nematodes, particularly in those with disrupted copper homeostasis, whereas ionic silver posed a higher potential risk to mice. The findings highlight the need for cautious evaluation of SNPs in biomedical applications.

Acknowledgements. This work was supported by the Russian Science Foundation [grant number 20-74-10087]. TEM studies were done using equipment of the Federal Joint Research Center "Material science and characterization in advanced technology" supported by the Ministry of Science and Higher Education of the Russian Federation.

Citation: Rev. Adv. Mater. Technol., 2025, vol. 7, no. 2, pp. 114–123

View online: https://doi.org/10.17586/2687-0568-2025-7-2-114-123

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