

Extended Abstract

Antimicrobial Properties of Bionanomaterials Obtained from Vegetable Sources [†]

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† Presented at the 15th International Symposium “Priorities of Chemistry for a Sustainable Development” PRIOCHEM, Bucharest, Romania, 30th October–1st November 2019.

Published: 17 October 2019

Keywords: bionanomaterials; silver; vegetable extract; antimicrobial activity

Antibiotic resistance of pathogenic microorganisms is a major problem of the 21st century. In this sense, finding alternatives to classical antibiotics is one way this problem can be solved. In this respect, we initiated research which aimed at the testing of bionanomaterials containing Ag⁺ or Au³⁺ ions and some vegetable extracts. The vegetable used for obtaining nanobiomaterials were the following: *Ranunculus ficaria* (AgNPrf, AuNPrf); *Allium ursinum* (AgNPau, AuNPau); *Hippophae rhamnoides* (AgNPphr, AuNPphr); *Brassica oleracea* variety gongyloides, white and purple (AgNPbow, AgNPbop, AuNPbow, AuNPbop); and *Cucurbita maxima*, Valenciano variety (AgNPcm, AuNPcm). Bionanomaterials were synthesized according to the methodology presented by Sorescu et al [1].

The antibacterial activity was evaluated using the disk-diffusion method [2], with microbial inoculum sown on the surface of Petri dishes. The obtained values were quantified compared to those obtained with the usual antibiotics [3–5]. Microorganisms used in biological tests were isolated in medical clinique from patients (*Escherichia coli*, *Bacillus subtilis*) or were purchased from DSMZ collection (*Candida rugosa*).

The results obtained indicated that the *Escherichia coli* present sensitivity to some bionanomaterials synthesized with Ag⁺. From this point of view, good results are obtained for bionanomaterials AgNPphr, AgNPcm, and AgNPbop. In the case of the last two bioproducts, the inhibition diameters obtained are comparable with the antibiotic ampicillin.

The best results were observed in the case of the AgNPrf bioproduct, for which we obtained higher inhibition diameters, comparable with antibiotics such as: Ampicillin, Carbencilin, Ticarcillin, Cefazolin, Cefaclor, Nalidixic acid, Gentamicin, and Kanamicin.

In the case of bionanomaterials synthesized with Au³⁺, the obtained results showed that these do not have biological activity on the studied microorganisms, except AuNPphr, where the occurrence of the resistance phenomenon (AuNPphr) is observed. It is important to mention the fact

that the phenomenon of resistance also appears in the case of nanomaterials with Ag⁺, like AgNPau, Ag NPbow.

In conclusion, nanobiomaterials synthesized with Ag⁺ and plant extracts have biological activity in the case of Gram-negative bacteria, the best results being obtained in the case of the bioproduct synthesized with *Ranunculus ficaria* extract.

Acknowledgments: This paper was prepared with the financial support of the project PN 19.23.03.01.04.

Conflicts of Interest: Authors declare no conflict of interest.

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