

Editorial

Novel Green Nanotechnologies Applied in Environmental Protection and Health

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Today, humanity is facing serious problems due to the environmental pollution. Several tons of plastic or industrial wastes are dumped randomly in nature, polluting waters and soils, thus creating many health problems for people and all living things. To keep the Earth clean, we need to adopt eco-friendly strategies sustaining human and environmental health. Green nanotechnology—the science of the future—can help to prevent future environmental problems and improve the general quality of life and human well-being. In addition, bioinspiration and biomimetics became new trends in green nanotechnology for the “green” development of multifunctional materials with potential applications in the biomedical field and in environmental protection [1–3].

It is known that, since ancient times, most sources of natural substances with healing effects are of plant origin. Plants contain a wide range of substances, which have been used for millennia in traditional medicine [4,5]. Researchers have tried to replace synthetic products with natural products, such as plant extracts, because herbal extracts/essential oils contain compounds with fungicidal properties [6]. These compounds have several advantages. They have fewer side effects for humans and are more environmentally friendly and have lower production costs; in some cases, their antimicrobial properties may be superior to synthetic products [7]. Plants are preferred in the synthesis of metal nanoparticles due to their availability, low cost, abundance in nature, recyclability of vegetable residues and thus production costs are minimized [8–10]. The phyto-materials have attracted more and more attention to the scientific world because they combine the benefits of plants with other components, resulting in materials with improved properties and extended applicability. A wide variety of chemical compounds with different structures and properties can be produced from plants. These include phenols, alkaloids, saponins, terpenoids, flavonoids, etc. In recent years, these phyto-substances have been the subject of numerous *in vitro* and *in vivo* tests to determine their effectiveness as antimicrobial agents against pathogenic bacteria, fungi and viruses, or as antioxidant and anti-cancer agents.

This special issue “Novel Green Nanotechnologies Applied in Environmental Protection and Health” aimed to highlight many aspects related to “green” approaches to design innovative materials/systems, and eco-friendly strategies for applications in Environmental Protection and Health. Interesting topics are proposed. By using natural resources and recycling food and vegetal wastes, and also the bioinspiration and biomimetics for development of novel materials, the environment pollution can be avoided, thus preventing severe problems affecting human health.

This Special Issue kindly invites authors to contribute with original research articles and review papers describing novel green nanotechnologies applied to design eco-friendly materials, by exploiting natural resources and recycling food and vegetal wastes, and converting them into valuable materials with applications in various fields.

Potential topics include, but are not limited to the following:



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- Eco-nano technologies and advanced materials;
- Environmental and biomedical applications of “green” nanomaterials;
- Eco-friendly strategies for development of (bio)composite/(bio)polymeric materials;
- Biomedical applications of nanoparticles/ materials;
- Nanoparticles for drug delivery systems;
- Biological activity of nanoparticles;
- “Green” materials and technologies for electronics;
- Bioinspiration and biomimetics for development of novel materials;
- Bioplastics;
- Eco-friendly packaging materials;
- Biopesticides;
- Photocatalysis;
- Wastewater treatment;
- Eco-Friendly Corrosion Inhibitors.

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References

1. Barbinta-Patrascu, M.E.; Gorshkova, Y.; Ungureanu, C.; Badea, N.; Bokuchava, G.; Lazea-Stoyanova, A.; Bacalum, M.; Zhigunov, A.; Petrovič, S.M. Characterization and Antitumoral Activity of Biohybrids Based on Turmeric and Silver/Silver Chloride Nanoparticles. *Materials* **2021**, *14*, 4726. [[CrossRef](#)]
2. Gorshkova, Y.; Barbinta-Patrascu, M.-E.; Bokuchava, G.; Badea, N.; Ungureanu, C.; Lazea-Stoyanova, A.; Răileanu, M.; Bacalum, M.; Turchenko, V.; Zhigunov, A.; et al. Biological Performances of Plasmonic Biohybrids Based on Phyto-Silver/Silver Chloride Nanoparticles. *Nanomaterials* **2021**, *11*, 1811. [[CrossRef](#)] [[PubMed](#)]
3. Mironescu, M.; Lazea-Stoyanova, A.; Barbinta-Patrascu, M.E.; Virchea, L.-I.; Rexhepi, D.; Mathe, E.; Georgescu, C. Green Design of Novel Starch-Based Packaging Materials Sustaining Human and Environmental Health. *Polymers* **2021**, *13*, 1190. [[CrossRef](#)] [[PubMed](#)]
4. Barbinta-Patrascu, M.E.; Badea, N.; Bacalum, M.; Ungureanu, C.; Suica-Bunghez, I.R.; Iordache, S.M.; Pirvu, C.; Zgura, I.; Maraloiu, V.A. 3D hybrid structures based on biomimetic membranes and *Caryophyllus aromaticus*—“Green” synthesized nano-silver with improved bioperformances. *Mater. Sci. Eng. C* **2019**, *101*, 120. [[CrossRef](#)] [[PubMed](#)]
5. Cortés-Rojas, D.F.; Fernandes de Souza, C.R.; Oliveira, W.P. Clove (*Syzygium aromaticum*): A precious spice. *Asian Pac. J. Trop. Biomed.* **2014**, *4*, 90. [[CrossRef](#)]
6. Zaccardelli, M.; Pane, C.; Caputo, M.; Durazzo, A.; Lucarini, M.; Silva, A.M.; Severino, P.; Souto, E.B.; Santini, A.; De Feo, V. Sage Species Case Study on a Spontaneous Mediterranean Plant to Control Phytopathogenic Fungi and Bacteria. *Forests* **2020**, *11*, 704. [[CrossRef](#)]
7. Venturoso, L.R.; Bacchi, M.A.; Gavassoni, W.L.; Conus, L.A.; Pontim, B.C.A.; Bergamin, A.C. Antifungal activity of plant extracts on the development of plant pathogens. *Summa phytopathol.* **2011**, *37*, 18. [[CrossRef](#)]
8. Makarov, V.V.; Love, A.J.; Sinityna, O.V.; Makarova, S.S.; Yaminsky, I.V.; Taliansky, M.E.; Kalinina, N.O. “Green” nanotechnologies: Synthesis of metal nanoparticles using plants. *Acta Naturae* **2014**, *6*, 35. [[CrossRef](#)] [[PubMed](#)]
9. Barbinta-Patrascu, M.E.; Nichita, C.; Badea, N.; Ungureanu, C.; Bacalum, M.; Zgura, I.; Iosif, L.; Antohe, S. Biophysical aspects of bio-nanosilver generated from *Urtica dioica* Leaves and *Vitis vinifera* fruits’ extracts. *Rom. Rep. Phys.* **2021**, *73*, 601.
10. Zgura, I.; Enculescu, M.; Istrate, C.; Negrea, R.; Bacalum, M.; Nedelcu, L.; Barbinta-Patrascu, M.E. Performant composite materials based on oxide semiconductors and metallic nanoparticles generated from cloves and mandarin peel extracts. *Nanomaterials* **2020**, *10*, 2146. [[CrossRef](#)]

Short Biography of Authors

Marcela-Elisabeta Barbinta-Patrascu is Associate Professor at the University of Bucharest—Faculty of Physics, Department of Electricity, Solid state Physics and Biophysics, Bucharest—Măgurele, Romania. She published 75 scientific papers, 3 books and 2 book chapters.

She received 34 awards for her publications, communications or competitions. International cooperation. Reviewer at 34 international journals. Member of *Editorial Board* or *Reviewer Board* of many journals: *Materials (Basel)*; *Nanomaterials (Basel)*; *Journal of Nanomaterials (Hindawi)*, etc. Member of Organizing Committees of 23 International Conferences. Leader in projects related to “green” design of biohybrids with biomedical applications, and member team of many research projects. She is a member of several distinguished academic societies. She is the first initiator of *multifunctional chlorophyll a-labelled phytosomes* (containing curcumin, chitosan and folic acid-functionalized silver nanoparticles). She is the first initiator of “*Green Nanotechnology*” methods and of *Multifunctional Biohybrids based on Artificial cell membranes*, at the Faculty of Physics, University of Bucharest. Her research interests include: (Bio)Chemistry; “Green” Chemistry; Bioenergetics; Molecular Genetics; Systems and processes in living matter; Biomimetics; Biophysics; Medical Physics; Materials Science & Engineering; Nanosciences; Biogenic nanoparticles and biohybrids; (Bio)Eco-Nanotechnology; Biopesticides; Bioplastics; “Green” Design of Bio-Multifunctional Materials; Optical microscopy of biological structures; Drug delivery systems; Simulation and quantification of oxidative stress.

Nicoleta Badea is Professor at the University Politehnica of Bucharest—Faculty of Chemical Engineering and Biotechnology, Department of General Chemistry. She has a broad experience on selective natural extracts (with antioxidant and photo-protective activity) applied in nutrition, cosmetics, and pharmacology. Her main expertise is associated with synthesis and characterization of lipid nanoparticles and silver nanoparticles (e.g., determination of antioxidant activity, photoprotection, pharmaco-kinetic release behaviour, permeability etc. (UV-Vis, chemiluminescence, fluorescence, HPLC, etc.). She published 120 scientific papers, 2 books, 1 book chapter and 11 patents. Her research interests include: green nanoparticles; lipid nanoparticles; natural extracts; encapsulation; antioxidant activity; drug delivery; photoprotection.

Irina Zgura is Scientific researcher II, within the Laboratory of Optical Processes in Nanostructured Materials, INCDFM, Magurele. She published 76 scientific papers, 4 book chapters, 4 patents and 2 patent applications. International cooperation. Reviewer at 10 international journals. She received 8 awards for her publications, communications or patents. Leader in projects related to “green” design of biohybrids with biomedical applications, and member team of many research projects. She was Team Leader in the Project “Integrated process for the removal of nitrates and organochlorine pesticides from natural water contaminated related to agricultural practices”. Research interests involve wet chemical/green synthesis of metal oxide nanostructures, of metallic nanoparticles and their characterization, wetting behavior of textiles coated with ZnO thin films and nanoparticles; studies on multifunctional textile materials; “Green” Design of Bio-Multifunctional Materials, Materials Science and Engineering; Nanosciences.