Proceedings of the 10th World Congress on New Technologies (NewTech'24)
Barcelona, Spain - August 25-27, 2024
Paper No. ICNFA 101
DOI: 10.11159/icnfa24.101

Nanotechnology Approaches for the Development of Next-Generation Dental and Personal Care Products

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Extended Abstract

The scientific progress recorded in the area of nanotechnology led to the proposal of nanomaterials for a tremendous number of applications. However, with the increase knowledge in this area, their drawbacks (including potential toxic effects for the environment or human health) became obvious for researchers all over the world. As a consequence, the main focus shifted from the discovery of new applications for the nanomaterials synthesized by classical methods towards the establishment of new synthesis routes, which allows the development of nanomaterials with smaller environmental and health impact. Among these methods, phytosynthesis, or the development of nanomaterials through the use of natural extracts, represents one of the most studied methods. Accompanied by several advantages (including the reduced toxicity and increased biomedical potential [1-3]), the method allowed our group to propose the development of tunned nanomaterials, for particular applications, including the development of new dental materials [4, 5], personal care products [6], sensors [7], and many others.

The present work aims to present our experience in this field, as well as the results obtained regarding the use (for the first time in the literature) of the phytosynthesized nanoparticles and apatitic materials for the enhancement of glass ionomer cements. The incorporation of nanoparticles (phytosynthesized using different plants, such as *Hyssopus officinalis* L., *Marrubium vulgare* L., *Origanum vulgare* L. or *Lamium album* L.)-decorated magnesium-substituted hydroxyapatite led to a significant increase of the glass ionomer cement's compression strength of over 30%, as well as to a significant antimicrobial effect against several lines (*Pseudomonas aeruginosa* ATTC 27853, *Escherichia coli* ATCC 25922, *Pseudomonas aeruginosa* CL, *Staphylococcus aureus* 25923, *Staphylococcus haemolyticus* CL213, *Candida albicans* ATCC 10231, *Candida albicans* 6853). Similar nanomaterials (developed using grapevine wastes) were also used for the development of cosmetic formulations (presented as hydrogels) with sun protection factor, as well as significant antimicrobial properties.

Acknowledgment: The authors gratefully acknowledge the support obtained through a grant of the Romanian National Authority for Scientific Research and Innovation, CNCS—UEFISCDI, project No. PN-III-P4-PCE-2021-0292, contract 92PCE/2022, within PNCDI III, and by a grant of the Romanian Ministry of Education and Research, CCCDI-UEFISCDI, project No. PN-III-P2-2.1-PED-2021-0273, contract 644PED/2022, within PNCDI III, as well as the support offered by the Ministry of Research, Innovation and Digitization through Program 1 — Development of the national research and development system, Subprogram 1.2 — Institutional performance — Projects to finance excellence in RDI, Contract no. 15PFE/2021.

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