

# International Conference on Functional Nanomaterials and Nanodevices

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## ***ABSTRACT BOOKLET***

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Conference Venue:

**Hotel Mercure Warszawa Grand \*\*\*\***

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## Surface-modified PLGA Microscaffolds for Advanced Dental Materials

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Polymer microscaffolds have emerged as a promising solution in dental applications, offering innovative approaches for addressing various oral health issues. These microscaffolds, composed of biocompatible polymers, provide a versatile platform for tissue engineering and regenerative dentistry. One significant application of polymer microscaffolds is in the treatment of dental caries. By utilizing these scaffolds, dentists can effectively restore the structural integrity of decayed teeth. The microscaffolds can be loaded with antimicrobial or remineralizing agents, promoting the regeneration of dental tissues and preventing further decay. Additionally, polymer microscaffolds have proven valuable in periodontal therapy. They can deliver therapeutic agents, such as growth factors, antibiotics, or anti-inflammatory drugs, directly to the site of periodontal disease. This localized drug delivery system enhances the effectiveness of treatment while minimizing systemic side effects. Furthermore, microscaffolds play a crucial role in dental implantology. They can support the growth of new bone tissue around dental implants, promoting osseointegration and ensuring long-term stability. The porous nature of the microscaffolds allows for the infiltration of cells and nutrients, facilitating the formation of a strong bond between the implant and the surrounding bone. Overall, the dental applications of polymer microscaffolds represent a significant advancement in modern dentistry.

Polymer microscaffolds have emerged as a novel approach in dental caries treatment due to their unique properties and potential for tissue regeneration. These microscaffolds typically comprise biocompatible polymers providing a three-dimensional tissue growth and repair framework.

Nano-hydroxyapatite is a nanoscale form of hydroxyapatite, a naturally occurring mineral in our bones and teeth, known for its biocompatibility and ability to enhance remineralization and repair of tooth enamel. Silver nanoparticles, on the other hand, are tiny particles of silver with unique antimicrobial properties, making them effective in inhibiting the growth of bacteria and promoting wound healing in various medical applications.

The fabrication involves creating fibrous structures out of PLGA via electrospinning, which is then decorated with nanohydroxyapatite and silver nanoparticles. The use of polymer microscaffolds in dental treatment has shown promising results in various aspects of dental restoration. These scaffolds will provide mechanical support to the affected tooth and facilitate the regeneration of dental tissues and antibacterial properties. Studies have demonstrated that polymer microscaffolds can promote the proliferation and differentiation of dental pulp stem cells, which play a crucial role in dentin regeneration, the primary mineralized tissue in teeth.<sup>[1-2]</sup>

Polymer microscaffolds represent a promising advancement in dental caries treatment. Fabricating these materials, using techniques such as electrospinning and electrospraying, enables the creation of porous structures that support tissue regeneration and provide antibacterial effects.

### References:

- [1] Tayanloo-Beik, Akram, et al. "Application of Biocompatible Scaffolds in Stem-Cell-Based Dental Tissue Engineering." (2022): 1-28.
- [2] Banerjee, Kaushita, et al. "Advances in neoteric modular tissue engineering strategies for regenerative dentistry." *Journal of Science: Advanced Materials and Devices* (2022): 100491.

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## NANOMAT2023

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### Certificate of Participation

This is to certify that **Mohammad Ali Haghghat Bayan** of the Institute of Fundamental Technological Research, Polish Academy of Sciences, Warsaw, Poland attended and gave an oral talk entitled "*Surface-modified PLGA Microscaffolds for Advanced Dental Materials*" in the **International Conference on Functional Nanomaterials and Nanodevices (NANOMAT2023)**, held at Hotel Mercure Warszawa Grand, Warsaw, Poland during August 27–30, 2023.

We would like to thank you for your participation and for contributing to the success of NANOMAT2023.



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