

(English version below)

Execuția activităților vizate în cadrul etapei II s-au desfășurat în acord cu planul de realizare al proiectului, într-o strânsă și permanentă colaborare a celor trei parteneri implicați (IFIN-HH ca și Coordonator, UBB ca Partener 1 și ITIM ca Partener 2). Astfel, s-a permis realizarea integrală a obiectivelor științifice și manageriale propuse și s-a atins cu succes indicatorii de rezultate corespunzătoare acestei etape. Obiectivul central al acestei etape a fost de a dezvolta în laborator un pansament flexibil și inteligent, care să posede atât proprietăți fototermice cât și antibacteriene. Dintre cele mai importante rezultate obținute în această etapă menționăm: i) integrarea nanoparticulelor de aur (AuNPs) de forma sferică între fibrele bumbacului steril, folosite în cadrul acestui proiect ca și agenți termoplasmonici eficienți în regiunea spectrală vizibil; ii) integrarea nanoparticulelor de forma bipiramidala într-un substrat flexibil de PDMS ii) funcționalizarea nanoplatformelor plasmonice cu peptide antibacteriene specifice, folosite în cadrul acestui proiect ca și agenți antibacterieni și antibiofilm; iii) caracterizarea acestui pansament inteligent pe bază de bumbac atât din punct de vedere optic și morfologic, cât și din punctul de vedere al eficienței fototermice; iv) investigarea efectului antimicrobian al acestui pansament asupra a două tulpini bacteriene (*E. coli* și *S. aureus*); v) investigarea biocompatibilității pansamentelor în vederea utilizării topice a acestora și vi) investigarea efectului pansamentului asupra biofilmului bacterian de *E. coli* și *S. aureus*.

Indicatorii de realizare îndepliniți în cadrul etapei sunt următorii:

- **Prezentare poster** – Florina Zorilă, Mioara Alexandru, Mina Răileanu, Raluca Borlan, Andreea Campu, Ioan Turcu, Monica Focsan and Mihaela Bacalum, New flexible wound dressing with antimicrobial capabilities using PDMS functionalized with AuBPs-AMPs complexes, The 14th International Conference of Processes in Isotopes and Molecules (PIM2023), 19 – 22 Sept 2023, Cluj-Napoca, Romania.
- **Prezentare poster** – Bogdan Zorilă, Mina Răileanu, Mihaela Bacalum, Antimicrobial peptides interaction with model and mammalian membranes, 14th International Conference of Processes in Isotopes and Molecules (PIM2023), 19 – 22 Sept 2023, Cluj-Napoca, Romania.

- **Prezentare poster** - Daria Stoia, Mihaela Bacalum, Ioan Turcu, Simion Astilean, Monica Focsan – Synergistic Phototherapeutic and Antimicrobial Smart Wound Patch: The Next Generation Approach for Efficient Wound Treatment, Advanced Research Workshop (ARW) supported by NATO SPS Programme, 3 – 5 Oct 2023, San Felice del Circeo, Italia.
- **Prezentare poster** – Nicoleta E. Dina, Alia Colniță, I. B. Cozar, Florina Zorilă, Mioara Alexandru, Mihaela Bacalum, Ioan Turcu – SERS-based monitoring of the efficiency of new generation antimicrobial agents, The 14th International Conference of Processes in Isotopes and Molecules (PIM2023), 19 – 22 Sept 2023, Cluj-Napoca, Romania.
- **Prezentare poster** – Ioan Turcu, Lorant Janosi, Adhesion of Short Antimicrobial Peptides to Bacterial and Mammalian Membrane Models – A Molecular Modeling Approach, The 14th International Conference of Processes in Isotopes and Molecules (PIM2023), 19 – 22 Sept 2023, Cluj-Napoca, Romania.
- **Prezentare poster** – Lorant Janosi, George Necula, Ioan Turcu, Mihaela Bacalum – Modeling Antimicrobial Peptides' Interactions with Bacterial and Mammalian Model Membranes, European Biophysical Societies' Association Congress 2023 31 July – 04 Aug 2023, Stockholm, Sweden.
- **Prezentare orală** – Daria Stoia, Raluca Borlan, Andreea Campu, Florina Zorila, Mioara Alexandru, Mina Raileanu, Mihaela Bacalum, Monica Focsan – Novel Smart Wound Patch: The Next Generation of Wound Dressing, The 14th International Conference of Processes in Isotopes and Molecules (PIM2023), 19 – 22 Sept 2023, Cluj-Napoca, Romania.
- **Prezentare Invitata** – R. Borlan, O. Soritau, E. Pall, S. Astilean and M. Focsan Plasmonic Nanoplatfroms: Versatile Multitasking Agents for Sensing, Imaging, Treatment, and Targeted Delivery in Medicine, 4 th International Conference on Nanomaterials for Health, Energy and the Environment, Calounda, Australia, 27-31 August, 2023
- **Capitol de carte** – Francesca Petronella, Daria Stoia, Yasmin Ziai, Federica Zaccagnini, Viviana Scognamiglio, Dana Maniu, Chiara Rinoldi, Monica Focsan, Amina Antonacci, Filippo Pierini, Luciano De Sio – Plasmonic-based biosensors for the rapid detection of harmful pathogens, publicat in Optical Materials and Applications: Volume 1 Novel Optical Materials, ISBN 978-981-12-8059-7, Edited By: Iam Choon Khoo, Francesco Simoni and Cesare Umeton,

editura World Scientific Publishing, https://doi.org/10.1142/9789811280603_0006, 2023, 155–194.

- **Articol tip review publicat** - Mina Răileanu , Raluca Borlan, Andreea Campu, Lorant Janosi, Ioan Turcu, Monica Focsan, Mihaela Bacalum, No country for old antibiotics! Antimicrobial peptides (AMPs) as next-generation treatment for skin and soft tissue infection, international journal of pharmaceutics, 2023 Jul 25:642:123169 , <https://doi.org/10.1016/j.ijphar>

EN: The execution of the activities targeted in stage II were carried out in accordance with the project implementation plan, in a close and permanent collaboration of the three partners involved (IFIN-HH as Coordinator, UBB as Partner 1 and ITIM as Partner 2) . Thus, the full realization of the proposed scientific and managerial objectives was allowed and the result indicators corresponding to this stage were successfully reached. The central objective of this stage was to develop a flexible and intelligent dressing in the laboratory, possessing both photothermal and antibacterial properties. Among the most important results obtained at this stage, we mention: i) the integration of spherical gold nanoparticles (AuNPs) between sterile cotton fibers, used in this project as efficient thermoplasmonic agents in the visible spectral region; ii) integration of bipyramidal shaped nanoparticles into a flexible PDMS substrate ii) functionalization of plasmonic nanoplatfoms with specific antibacterial peptides, used in this project as antibacterial agents and antibiofilm; iii) characterization of this smart cotton-based dressing both optically and morphologically, as well as from the point of view of photothermal efficiency; iv) investigating the antimicrobial effect of this dressing on two bacterial strains (*E. coli* and *S. aureus*); v) investigating the biocompatibility of the dressings for their topical use and vi) investigating the effect of the dressing on the bacterial biofilm of *E. coli* and *S. aureus*.

- **Poster presentation** – Florina Zorilă, Mioara Alexandru, Mina Răileanu, Raluca Borlan, Andreea Campu, Ioan Turcu, Monica Focsan and Mihaela Bacalum, New flexible wound dressing with antimicrobial capabilities using PDMS functionalized with AuBPs-AMPs complexes, The 14th International Conference of Processes in Isotopes and Molecules (PIM2023), 19 – 22 Sept 2023, Cluj-Napoca, Romania.

- **Poster presentation** – Bogdan Zorilă, Mina Răileanu, Mihaela Bacalum, Antimicrobial peptides interaction with model and mammalian membranes, 14th International Conference of Processes in Isotopes and Molecules (PIM2023), 19 – 22 Sept 2023, Cluj-Napoca, Romania.
- **Poster presentation** - Daria Stoia, Mihaela Bacalum, Ioan Turcu, Simion Astilean, Monica Focsan – Synergistic Phototherapeutic and Antimicrobial Smart Wound Patch: The Next Generation Approach for Efficient Wound Treatment, Advanced Research Workshop (ARW) supported by NATO SPS Programme, 3 – 5 Oct 2023, San Felice del Circeo, Italia.
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- **Poster presentation** – Ioan Turcu, Lorant Janosi, Adhesion of Short Antimicrobial Peptides to Bacterial and Mammalian Membrane Models – A Molecular Modeling Approach, The 14th International Conference of Processes in Isotopes and Molecules (PIM2023), 19 – 22 Sept 2023, Cluj-Napoca, Romania.
- **Poster presentation** – Lorant Janosi, George Necula, Ioan Turcu, Mihaela Bacalum – Modeling Antimicrobial Peptides' Interactions with Bacterial and Mammalian Model Membranes, European Biophysical Societies' Association Congress 2023 31 July – 04 Aug 2023, Stockholm, Sweden.
- **Oral presentation** – Daria Stoia, Raluca Borlan, Andreea Campu, Florina Zorila, Mioara Alexandru, Mina Raileanu, Mihaela Bacalum, Monica Focsan – Novel Smart Wound Patch: The Next Generation of Wound Dressing, The 14th International Conference of Processes in Isotopes and Molecules (PIM2023), 19 – 22 Sept 2023, Cluj-Napoca, Romania.
- **Invited presentation** – R. Borlan, O. Soritau, E. Pall, S. Astilean and M. Focsan Plasmonic Nanoplatfoms: Versatile Multitasking Agents for Sensing, Imaging, Treatment, and Targeted Delivery in Medicine, 4 th International Conference on Nanomaterials for Health, Energy and the Environment, Calounda, Australia, 27-31 August, 2023

- **Book Chapter** – Francesca Petronella, Daria Stoia, Yasmin Ziai, Federica Zaccagnini, Viviana Scognamiglio, Dana Maniu, Chiara Rinoldi, Monica Focsan, Amina Antonacci, Filippo Pierini, Luciano De Sio – Plasmonic-based biosensors for the rapid detection of harmful pathogens, publicat in *Optical Materials and Applications: Volume 1 Novel Optical Materials*, ISBN 978-981-12-8059-7, Edited By: Iam Choon Khoo, Francesco Simoni and Cesare Umeton, editura World Scientific Publishing, https://doi.org/10.1142/9789811280603_0006, 2023, 155–194.
- **Published article** - Mina Răileanu , Raluca Borlan, Andreea Campu, Lorant Janosi, Ioan Turcu, Monica Focsan, Mihaela Bacalum, No country for old antibiotics! Antimicrobial peptides (AMPs) as next-generation treatment for skin and soft tissue infection, *international journal of pharmaceutics*, 2023 Jul 25:642:123169 , <https://doi.org/10.1016/j.ijphar>