

## Abstract

# Films-based hydrogel designed as functional biomaterials for treatment of skin wound †

Mariana Chelu <sup>1,\*</sup>, Jose Calderon Moreno <sup>1</sup>, Irina Atkinson <sup>1</sup>, Adriana Rusu <sup>1</sup>, Emma Adriana Ozon <sup>2</sup>, Ana-Maria Seciu-Grama <sup>3</sup> and Adina Magdalena Musuc <sup>1</sup>

<sup>1</sup> Romanian Academy: "Ilie Murgulescu" Institute of Physical Chemistry; josecalderonmoreno@yahoo.com (J.C.M.); irinaatkinson@yahoo.com (I.A.); arusu@icf.ro (A.R.)

<sup>2</sup> Department of Pharmaceutical Technology and Biopharmacy, Faculty of Pharmacy, "Carol Davila" University of Medicine and Pharmacy; emmacretu@yahoo.com (E.A.O.)

<sup>3</sup> National Institute of Research and Development for Biological Sciences; ana.seciu@yahoo.com (A.-M.S.-G.)

\* Correspondence: mchelu@icf.ro (M.C.); amusuc@icf.ro (A.M.M.)

† Presented at the 2nd International Electronic Conference on Biomolecules: Biomacromolecules and the Modern World Challenges, 1–15 Nov 2022; Available online: <https://iecbm2022.sciforum.net/>

**Abstract:** Multidrug-resistant bacteria can lead to skin wound infections, pain and long-term treatment. The development of high-performance dressings for the treatment of infected skin wounds represents a necessary requirement. In this paper it was designed and synthesized adhesive hydrogel films containing active agents such as hyaluronic acid (HA) and lidocaine, as local anesthetic. HA is an extremely effective and long-lasting moisturizer, biocompatible, with a regenerating effect, promoting the regeneration of damaged skin. Lidocaine has been incorporated to relieve acute pain and improve patient comfort and endurance. Films without HA and lidocaine were also produced as control sample. The successful synthesis of films obtained at room temperature, from aqueous solutions, was also confirmed by Fourier transform infrared analysis, X-ray diffraction and scanning electron analysis. Water absorption, adhesion and mechanical strength of the films-based hydrogel are improved with the introduction of HA and lidocaine, leading to the rapid skin wound healing process. The obtained materials will be used as promising materials able to restore the structural and functional properties of the skin. Wet adhesive backing films with good adhesion to skin, encapsulating HA with different molecular weights and lidocaine were developed to explore their potential to be used as a patch for painless treatment and healing of skin wounds. The cytocompatibility studies confirmed that the obtained films-based hydrogel have demonstrated no cytotoxic effect.

**Keywords:** hyaluronic acid; lidocaine; skin wound healing

**Citation:** Lastname, F.; Lastname, F.; Lastname, F. Title. *Biol. Life Sci. Forum* **2022**, *2*, x.

<https://doi.org/10.3390/xxxxx>

Academic Editor: Firstname Lastname

Published: date

**Publisher's Note:** MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



**Copyright:** © 2022 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

**Author Contributions:**

**Funding:**

**Institutional Review Board Statement:**

**Informed Consent Statement:**

**Data Availability Statement:**

**Conflicts of Interest:**

**Citation:** Lastname, F.; Lastname, F.;  
Lastname, F. Title. *Biol. Life Sci. Forum*  
**2022**, *2*, x.

<https://doi.org/10.3390/xxxxx>

Academic Editor: Firstname Last-  
name

Published: date

**Publisher's Note:** MDPI stays neu-  
tral with regard to jurisdictional  
claims in published maps and institu-  
tional affiliations.



**Copyright:** © 2022 by the authors.  
Submitted for possible open access  
publication under the terms and  
conditions of the Creative Commons  
Attribution (CC BY) license  
(<https://creativecommons.org/licenses/by/4.0/>).