

Electrospun Bioactive Polymer/Gelatin Coatings for Medical Application - Creation And Investigation

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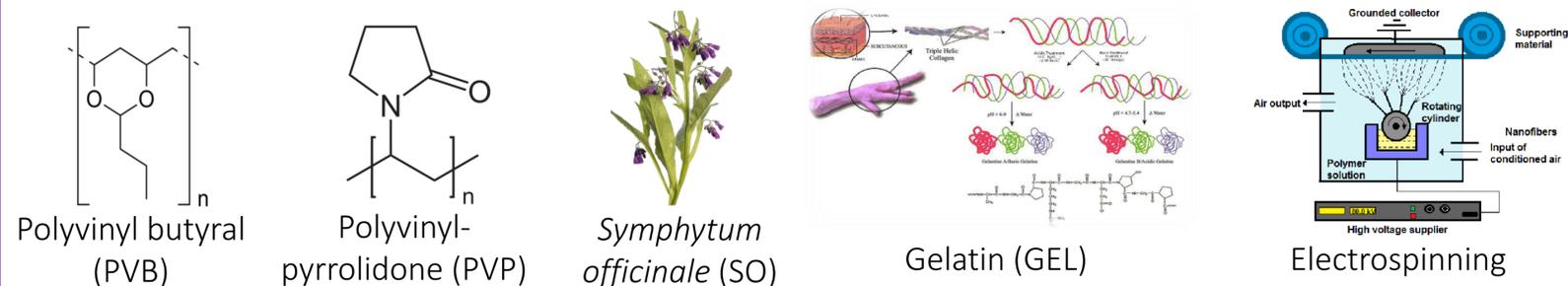
Introduction

The skin as the largest human organ protects internal organs and tissues from physical, chemical, and/or biological influences. However, skin has property to be injured, therefore fast regeneration of skin tissues and restoring security barrier is obligatory [1]. Nonetheless, wound healing is a very complex process, therefore, different types of medical dressing are used. Bioactive dressings (collagen) determines more rapid wound healing [2].

Electric spinning as one of leading technologies is highly on demand due to feasibility to form a nonwoven fabric from polymer solution. Nonwoven fabric protects wound and ensures air and moisture permeability and protects wound from microorganisms due to high porosity surface. Furthermore, the feasibility to use different combinations of polymers solutions is one of the main advantages of this method [3]. Furthermore, natural polymers extracted from plants, animals or microorganisms are desirable for the electric spinning process due to their practical application, durability, chemical and physical stability and low antigenicity. Collagen, gelatin, and/or hyaluronic acid have antimicrobial and anti-inflammatory properties, therefore are particularly valued in the medical industry [4].

The aim of this research is to develop bioactive polymer/gelatin coatings and investigate its feasibility for medical dressings.

Materials and methods

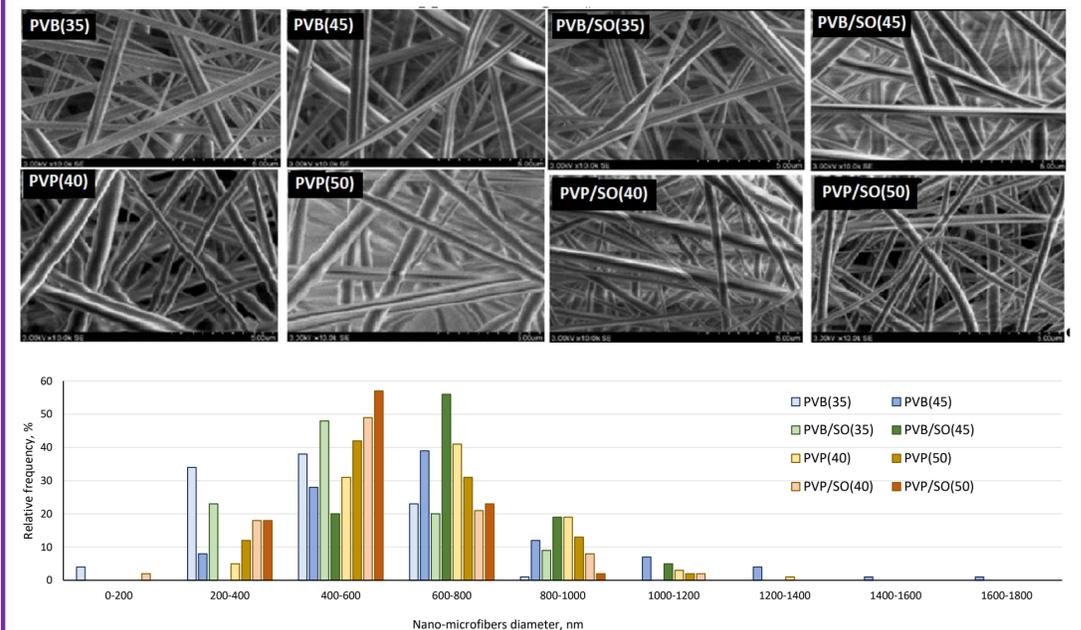


Conclusion

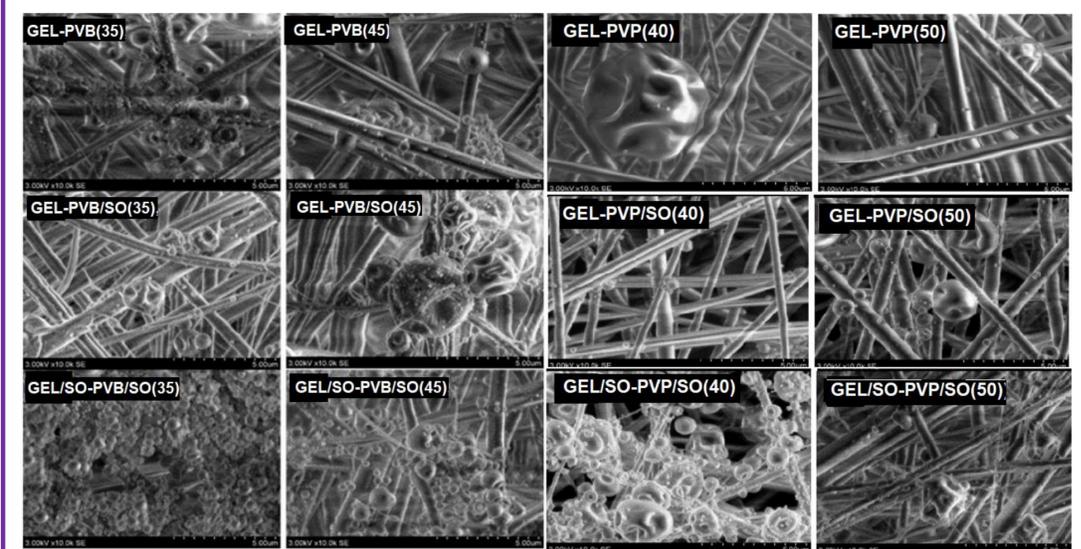
- The addition of bioactive *Symphytum officinale* root extract to the PVB and PVP compositions leads to the formation of higher number of micro/nanofibers with smaller diameter.
- Gelatin exhibits poor electrospinnability, therefore it can be formed on PVB and PVP fibers surface by the electrospaying process. The density of the droplets can be increased by the addition of bioactive *Symphytum officinale* root extract in polymers or/and gelatin compositions.

Results

Micro/nanofibers diameter distribution



Gelatin droplets quality



References

- [1] Azimi, B., Maleki, H., Zavagna, L., De la Ossa, J. G., Linari, S., Lazzeri, A., & Danti, S. (2020). Bio-based electrospun fibers for wound healing. *Journal of Functional Biomaterials*, 11(3), 67, <https://doi.org/10.3390/jfb11030067>
- [2] Enoch, S., & Leaper, D. J. (2005). Basic science of wound healing. *Surgery (Oxford)*, 23(2), 37-42, <https://doi.org/10.1383/surg.23.2.37.60352>
- [3] Buivydienė, D. (2020). Formation of fibrous materials for air filtration applications via melt electrospinning. PhD dissertation (Kauno technologijos universitetas), 3-4.
- [4] Fleck, C. A., & Simman, R. (2010). Modern collagen wound dressings: function and purpose. *The Journal of the American College of Certified Wound Specialists*, 2(3), 50-54, <https://doi.org/10.1016/j.jcws.2010.12.003>