

## Accepted Manuscript

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PII: S0928-4931(18)30794-X  
DOI: doi:[10.1016/j.msec.2018.08.050](https://doi.org/10.1016/j.msec.2018.08.050)  
Reference: MSC 8844  
To appear in: *Materials Science & Engineering C*  
Received date: 16 March 2018  
Revised date: 3 August 2018  
Accepted date: 22 August 2018

Please cite this article as: J.R. Dias, S. Baptista-Silva, A. Sousa, A.L. Oliveira, P.J. Bártolo, P.L. Granja, Biomechanical performance of hybrid electrospun structures for skin regeneration. *Msc* (2018), doi:[10.1016/j.msec.2018.08.050](https://doi.org/10.1016/j.msec.2018.08.050)

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## Biomechanical performance of hybrid electrospun structures for skin regeneration

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### Abstract

Wound dressings made by electrospun nanofibers have been demonstrating great potential to regenerate skin tissue as compared to the conventional membrane products available in the market. Until today most of the developed dressings have only demonstrated the capability to regenerate the dermis or epidermis. In this study we propose new hybrid electrospun meshes combining polycaprolactone and gelatin. Several approaches, multilayer, coating and blend were established to investigate the most appropriate hybrid structure with potential to promote skin regeneration in its full thickness. The structures were evaluated in terms of physico-chemical properties (porosity, water vapour permeability, contact angle and swelling degree) and according to its mechanical and biological performance. Multilayer and blend structures demonstrated to fit most of native skin requirements. However, looking to all the performed characterisation we considered multilayer as the most promising hybrid structures, due its high porosity which contributed to an ideal water vapour permeability rate and good mechanical and biological properties. Based on this multilayer structure is a promisor wound dressing.

**Keywords:** Hybrid structures; electrospun meshes; wound dressings; ECM; skin regeneration.

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