

ID# 2019465

Electrospinning of nanofibers and the perspectives for dermatological application

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INTRODUCTION

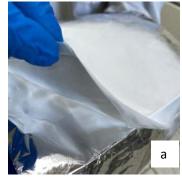
This study developed an electrospun nanostructured material from a polymeric solution containing essential oil. The technique enabled the production of fibers with high surface-to-volume ratio, porosity, and superior mechanical properties. The focus was to evaluate the material's antibacterial activity and its potential application in dermatological formulations.

METHODS

The antibacterial potential of lemongrass (*Cymbopogon schoenanthus*) essential oil was evaluated through minimum inhibitory concentration tests against three skin-associated bacteria. A polymeric solution containing ethylcellulose (EC), polyvinylpyrrolidone (PVP), and lemongrass essential oil (LEO) was electrospun, with process parameters optimized for fiber production. The resulting fibers were characterized for morphology, thermal behavior, sweat absorption, and antibacterial activity.

RESULTS

Viable nanofibers were obtained from a 10% EC/PVP (8:2) solution with 1% LEO using a portable electrospinning device. SEM analysis showed a homogeneous, interconnected 3D fiber network. The material demonstrated suitable thermal stability for dermatological applications and protected the essential oil from degradation. The fibers exhibited sweat absorption capacity and antibacterial activity against *S. hominis*, indicating potential for use in wound dressings or deodorant formulations.



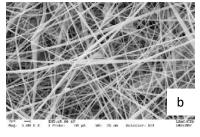


Figure 1: (a) Appearance of EC/PVP/LEO nanofibers produced in the laboratory, (b) SEM of EC/PVP/LEO nanofibers

CONCLUSION

This research demonstrated the feasibility of developing a nanofiber made of ethylcellulose and polyvinylpyrrolidone containing lemongrass essential oil for antibacterial and absorbent applications. Electrospinning may serve as an effective strategy for preserving the properties of active ingredients, with potential applications in pharmaceutical, dermatological, and cosmetic fields.

ACKNOWLEDGEMENTS:

We acknowledge the Coordination for the Improvement of Higher Education Personnel (CAPES-Brazil) and the National Council for Scientific and Technological Development (CNPq, 305329/2022-7)

REFERENCES:

DOI: 10.1002/admt.202201723

DOI: 10.1016/j.pmatsci.2020.100721