

April 15, 2026

Entoingredients for Skin Barrier Recovery: Insights from Nanocarriers and Semisolid Formulations



Catarina Pereira Leite

CBIOS, Lusófona University and LAQV REQUIMTE, Faculty of Pharmacy, University of Porto
catarina.leite@ulusofona.pt
<https://cbios.ulusofona.pt/research/formulation-strategies-nanosolutions>

The growing demand for novel, resource-efficient ingredients for topical products is driving interest in insect-biomass-derived materials (entoingredients). Lipid extracts from Black Soldier Fly larvae (BSFL) have emerged as sustainable biomaterials with potential for managing skin conditions characterized by barrier impairment, such as atopic dermatitis (AD). This work addresses the incorporation of BSFL lipids into skin-care platforms, including lipid-based nanosystems and creams.

BSFL-based solid lipid nanoparticles (SLNs) formed an occlusive lipid film that reduced moisture evaporation. In vitro and in vivo assessments showed good compatibility in both healthy and atopic volunteers, with no relevant changes in erythema or transepidermal water loss, alongside with increased hydration and indicators of barrier reinforcement.

Nanoemulsions achieved droplet sizes <150 nm with low polydispersity, high encapsulation efficiency of corticosteroids, promising storage stability and controlled drug-release behaviour.

Finally, BSFL-containing O/W creams were successfully formulated, demonstrating promising stability under ambient and accelerated conditions, appropriate rheological behaviour and good biocompatibility in healthy volunteers.

Overall, BSFL-derived lipids appear to be functional entoingredients for nanosystems and semisolids, supporting moisturising effects and drug-delivery potential for topical AD management.

Short Bio

Catarina Pereira-Leite (CPL) is an Assistant Professor at the School of Health Sciences and Technologies, Lusófona University. She is an integrated member of CBIOS and a collaborator of LAQV/REQUIMTE. CPL holds a PhD in Pharmaceutical Sciences/Biological Sciences (Biochemistry), awarded in December 2017 by the University of Porto and University of São Paulo.

CPL's research focuses on biological barriers and the development of nanocarrier-based strategies to modulate or overcome them, with applications in pharmaceutical and dermocosmetic products. Her early work addressed biological membranes to inform the design of safer and more effective anti-inflammatory therapies. More recently, she has been advancing bioinspired lipid-based delivery systems and semisolid formulations for skin applications, including barrier-oriented approaches for atopic dermatitis.

CPL has published over 30 peer-reviewed journal articles and regularly disseminates her work through oral and poster communications at national and international conferences. She is actively involved in supervising PhD, MSc, and BSc students, teaches in undergraduate and advanced training programmes, and contributes to scientific outreach activities for the general public and secondary-school students.

Acknowledgements

This research was funded by FCT - Foundation for Science and Technology, I.P., [DOI <https://doi.org/10.54499/EXPL/BTM-MAT/0112/2021> and DOI <https://doi.org/10.54499/UID/04567/2025>], as well as for the research grant attributed to C.A. [UI/BD/151423/2021]. The authors kindly thank Entogreen® (Ingredient Odyssey, S.A., Portugal) for supplying the larvae and larva oil used in this study.

Webinar Host

Cláudia Nunes, Nanoplatforms for Life Group