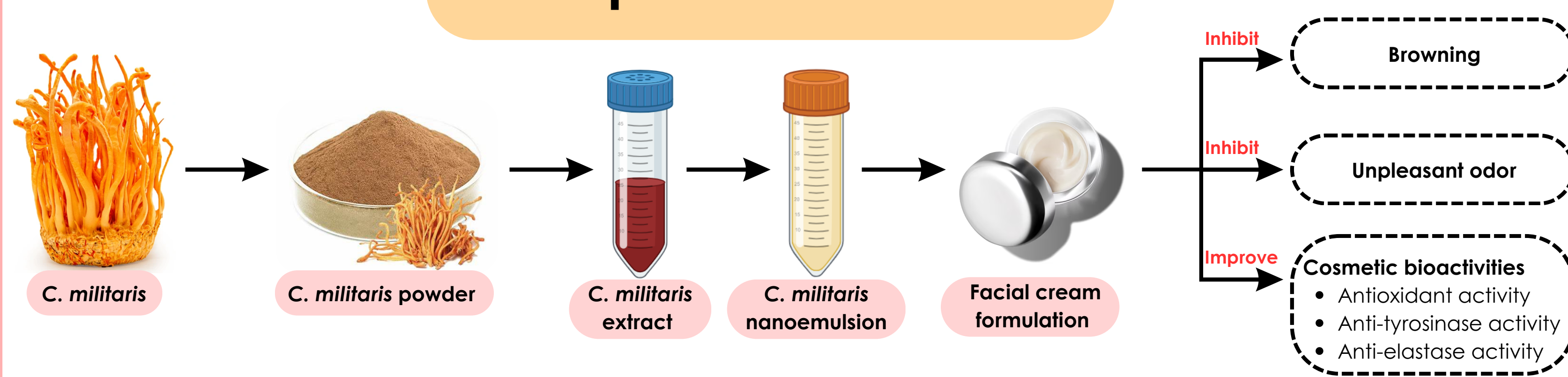


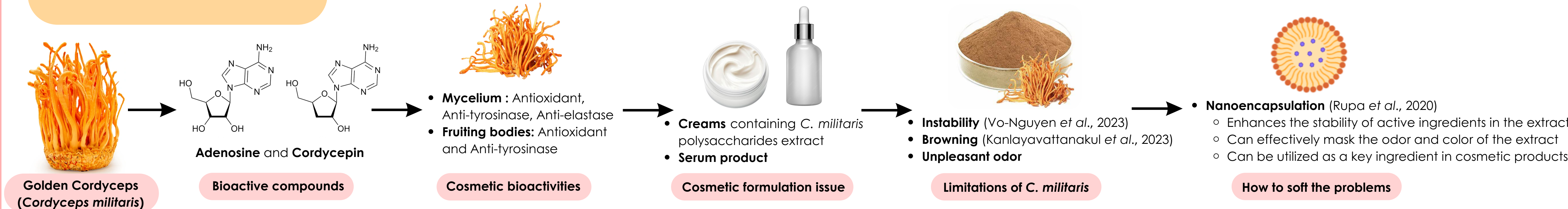
Graphical Abstract



Abstract

Cordyceps militaris is a valuable natural resource with diverse applications in medicine, foods, and cosmetics. In cosmetics, it demonstrates significant potential by inhibiting key enzymes such as tyrosinase and elastase, which are associated with skin pigmentation and aging. However, the incorporation of crude *C. militaris* extract (CE) into cosmetic formulations presents challenges, including instability, browning, and unpleasant odor. To address these issues, a nanoencapsulation strategy was employed to enhance the stability of the bioactive compounds and preserving the color and odor of the formulation. This study aimed to optimize the preparation of a nanoemulsion of *C. militaris* extract (NCE), evaluate its cosmetic bioactivities, stability, and applied for facial cream formulation. The 95% ethanolic extract of *C. militaris* was prepared and assessed for its antioxidant, anti-tyrosinase, and anti-elastase activities. The extract was then encapsulated using a nanoemulsion protocol, and its bioactivities and physical properties were compared with those of the crude extract. Stability was evaluated under accelerated conditions prior to formulating the facial cream. The results demonstrated that the crude extract exhibited antioxidant, anti-tyrosinase, and anti-elastase activities with IC50 values of 2.61±0.155, 2.980±0.262, and 1.567±0.130 mg/ml, respectively. The nanoemulsified extract (NCE) showed significantly improved antioxidant activity (IC50 of 2.094±0.067 mg/ml) and maintained comparable anti-tyrosinase and anti-elastase effects. It also exhibited superior stability in color and odor, though bioactivity slightly decreased. These findings address the initial challenges of instability and sensory degradation, labeling the way for the development of a stable and efficacious facial cream formulation.

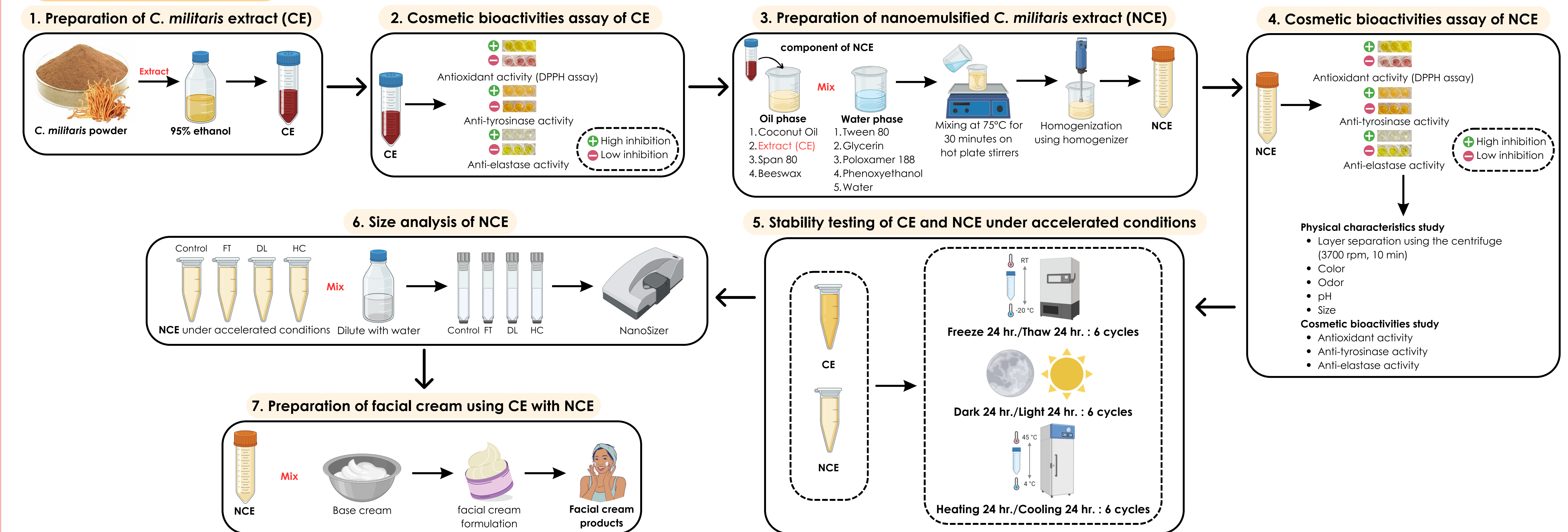
Introduction



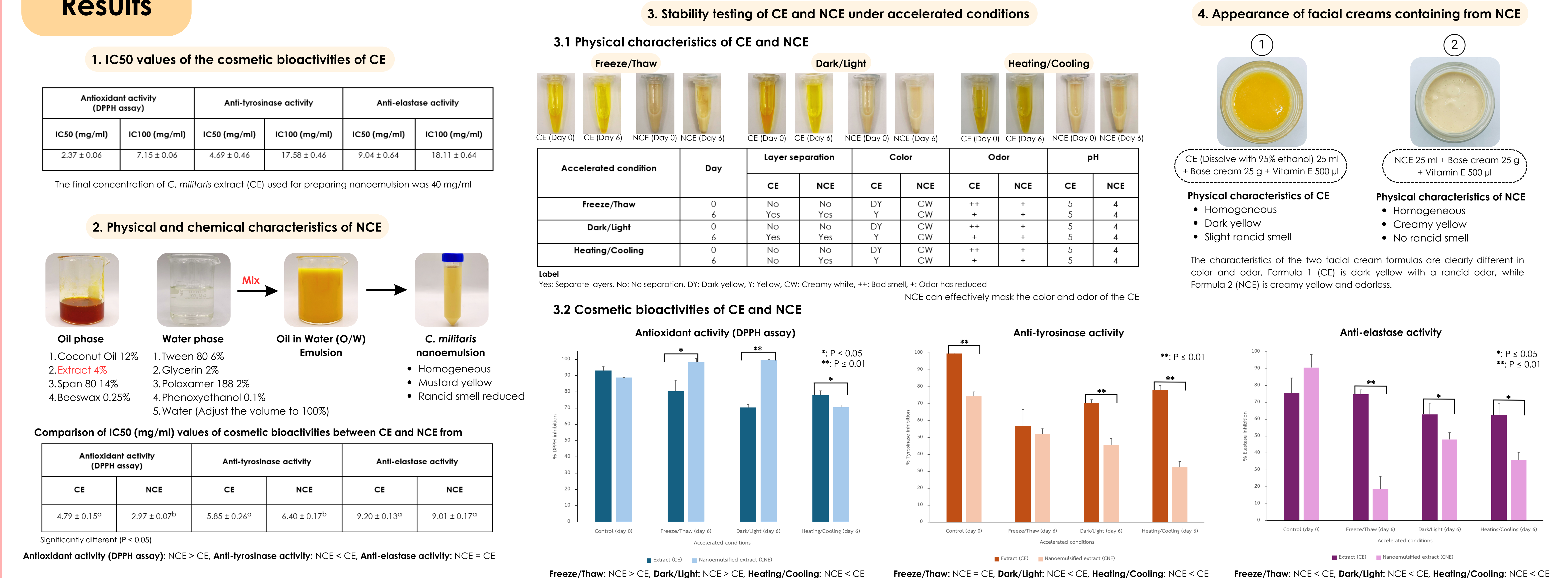
Objectives

- To prepare a nanoemulsion containing *C. militaris* extract (NCE) to enhance the stability of cosmetic bioactive compounds and preserve color and odor
- To develop a facial cream formulation nanoemulsified *C. militaris* extract (NCE)

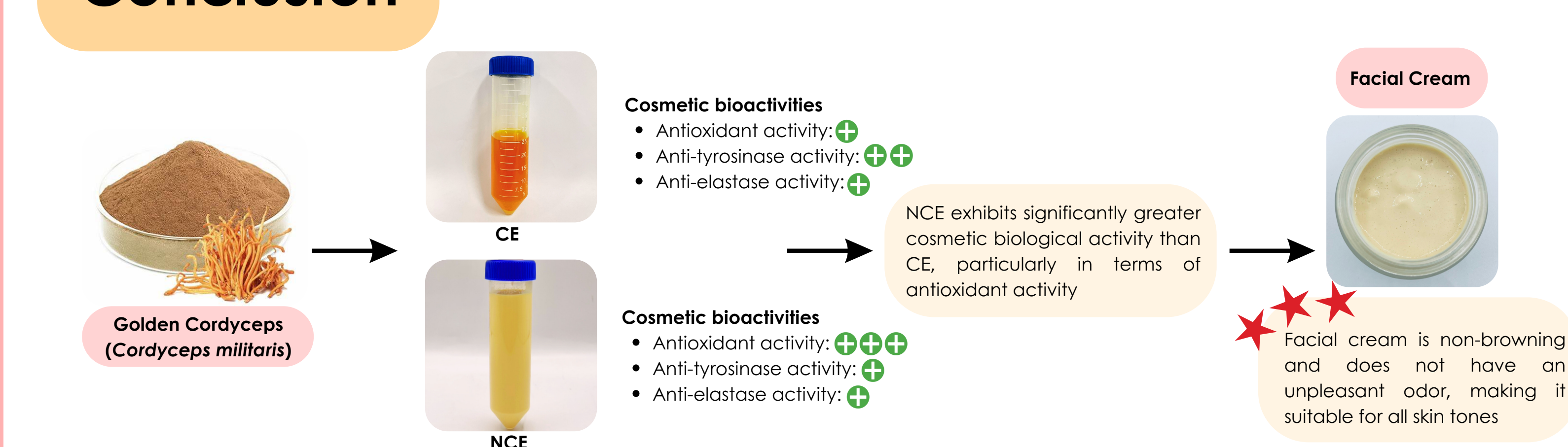
Methodology



Results



Conclusion



Acknowledgement

I sincerely thank Dr. Napalai Chaiyawan, Ms. Sirinthip Petchroj, and the members of the Applied Algae Research Laboratory (AARL), Department of Biology, Faculty of Science, Chiang Mai University, for their invaluable support throughout this research.

References

- Jędrejko, K. J., Lazur, J., & Muszyńska, B. (2021). *Cordyceps militaris*: An Overview of Its Chemical Constituents in Relation to Biological Activity. *Foods*, 10(11), 2634. <https://doi.org/10.3390/foods10112634>
- Rupa, E. J., Li, J. F., Arif, M. H., Yaxi, H., Pujia, A. M., Chan, A. J., Hoang, V.-A., Kaliraj, L., Yang, D. C., & Kang, S. C. (2020). *Cordyceps militaris* Fungus Extracts-Mediated Nanoemulsion for Improvement Antioxidant, Antimicrobial, and Anti-Inflammatory Activities. *Molecules*, 25(23), 5733. <https://doi.org/10.3390/molecules25235733>