

ANTIFUNGAL AND ANTIBACTERIAL PICKERING EMULSIONS BASED ON CYCLODEXTRINS

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Surfactants are usually used for the preparation of emulsions. However, potential drawbacks on the human body or on the environment can be observed for some of them (e.g. skin irritation, hemolysis, protein denaturation, etc.).¹ However, it is possible to use biocompatible emulsifiers such as native cyclodextrins (α -, β - and γ -CD). Indeed, the mixture of oil (paraffin oil or isopropyl myristate), water and native CDs results in the formation of Pickering emulsions.² The mechanism of emulsification was investigated by optical and transmission microscopies. The results prove that the oil/CD complexes precipitate and adsorb at the oil/water interface, and act as a solid emulsifier. Indeed, the precipitated complexes form a dense film at the oil/water interface. The multiple light scattering analysis proves that the dense interfacial film avoiding the coalescence of the dispersed phases. This kind of emulsions (biocompatibility, stability and surfactant free) can be used to obtain sustainable formulations of antifungal and antibacterial econazole (ECZ) nitrate (Figure 1).³

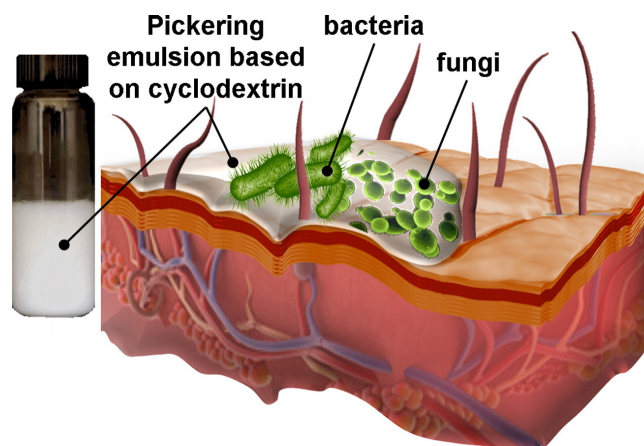


Figure 1. Concept for Antifungal and antibacterial Pickering emulsions based on cyclodextrins.

The properties of these Pickering emulsions can be adjusted depending on the relative proportions of water, oil and CD. pH, texture and viscosities are influenced by the size of the CD. Though, all the formulated Pickering emulsions remain acceptable for topical applications. These emulsions are globally stable without the use of other stabilizers such as polymers, colloidal silica or charges. The antifungal and antibacterial test showed that these Pickering emulsions, charged with ECZ nitrate, are able to inhibit fungus and bacterial growth (i.e. *C. albicans* and *S. aureus*). According to these results, it is anticipated that this Pickering emulsions based on CDs can be used for epidermal/dermal skin targeting. They offer the great advantage of avoiding the use of common petro-sourced surfactants and potentially toxic nanoparticles while keeping the same performances.

References

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