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Influence of the emollient structure on the properties of cosmetic emulsions containing lamellar liquid crystals

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Aim
The aim of this study is to understand the influence of the emollient structure on the properties of cosmetic emulsions containing lamellar liquid crystals.

Methods
Emulsification
Dispersion of oil droplets in water

- Recombined light rays
- Extra-Ordinary ray
- Ordinary ray
- Emulsion containing liquid crystals
- Plane Polarized Light
- Polarizer
- Light from source

Polarized light Microscope

Lamellar phases formation proved by the presence of α-gel present in all emulsions at 4.12 Å

Wide-angle X-ray diffraction

α-gel present in all emulsions at 4.12 Å

Distances for lamellar liquid phase ≠ function of oil polarity

Rheology

Tanδ for the emulsions containing nonpolar oils

Texture analysis

No direct link between emollient polarity and texture properties

Conclusion
Emollient structure has an impact on the properties of cosmetic emulsions like:
- Droplet size (♂ for polar oils)
- Microstructure (visually emulsions are finer for polar oils)
- Lamellar phase formation (oil polarity impacts the structure of lamellar liquid phase)
- Viscoelastic behavior (tanδ polar oils + tanδ nonpolar oils)

Perspectives
- Sensory analysis of the emulsions. Are the differences between polar and nonpolar oils perceptible?
- Determination of the emollient impact on lamellar phases hydration capacity.

Formulation
Alkylpolyglucoside / Fat alcohol

Emulsion

- Oil phase
- Water phase
- Emulsifier

- Lipophilic tail
- Polar head

Why lamellar phases?
Similar to stratum corneum lipidic structure = no irritation on the skin
Interlamellar water = great skin hydration potential

Results
Emulsions containing nonpolar oils / droplet size

- Normalized Particle Size Distribution

Polar emollients
Nonpolar emollients

Determination of the emollient impact on lamellar phases hydration capacity.

Diluted emulsion

Extruded emulsion

Nanoparticle diameter (µm)

Results coherent with microscopic observations

η

Distances for lamellar liquid phase ≠ function of oil polarity

Textures

No direct link between emollient polarity and texture properties

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