Lamellar Liquid Crystals LLC — Biomimetic Stratum Corneum Intercellular Lipids — Engineering Review 2026

Por Cristiano Ricardo · Publicado em 18/11/2026

Technical dermocosmetic engineering lecture by Prof. Cristiano Ricardo on lamellar liquid crystals (llc): biomimetic stratum corneum intercellular lipids (Colloidal Chemistry & Stratum Corneum Biomimetics), featuring colorful schematic diagrams and clinical data.

Versão online e eventuais atualizações:
https://professor.cristianoricardo.com/post/lamellar-liquid-crystals-llc-biomimetic-stratum-corneum-intercellular-lipids-2026-11-18

Colloidal Chemistry & Stratum Corneum Biomimetics · Cosmetic Engineering & Science

Unlike spherical droplet emulsions, lamellar liquid crystalline networks form layered bilayers that mirror human epidermal architectures.

Engineering Mechanism & Kinetic Flowchart

Standard Emulsion Droplet

Isolated Oil Core

Lamellar L-? Bilayer Network

Swollen water layers trapped between lipid sheets

Thermodynamic Self-Assembly in the L-alpha Phase

Combining non-ionic alkyl polyglucosides (e.g., Cetearyl Glucoside) with fatty alcohols (Cetearyl Alcohol) creates lamellar gel networks. Swollen interlamellar water sheets prevent solvent evaporation, creating an in-reservoir reservoir that continuously releases moisture to the stratum corneum.

Clinical Reduction of Transepidermal Water Loss (TEWL)

Because their spacing matches the 13-nm repeat periodicity of native human epidermal lamellae, LLC formulations fuse spontaneously with corneocyte lipid envelopes, restoring impaired skin barriers in atopic dermatitis and chemical peel recovery without occlusive comedogenicity.

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Polarized Light Microscopy Diagnostics

Under cross-polarized microscopy, lamellar liquid crystals exhibit distinctive birefringent 'Maltese Cross' optical patterns, serving as an in-process quality control fingerprint of successful multi-lamellar vesicle assembly.

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