NEWS RELEASE

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KOSÉ Develops "NMF-Complexed Liposomes" Featuring a Dual-Action Hydration for People Who feel Dry Quickly Even After Moisturizing

KOSÉ Corporation has developed "NMF-Complexed Liposomes," a novel technology designed to enhance the water-holding capacity of the stratum corneum through a dual-action strategy, targeting skin prone to dryness due to aging and other factors. This technology features a dual-action moisturizing function: storing water within stratum corneum cells using Natural Moisturizing Factor (NMF) and fundamentally rebuilding the structure of "intercellular lipids"—the cornerstone of the skin's barrier function—using liposomes. Clinical studies using a skincare formulation incorporating this technology confirmed a significant improvement in the skin's water-holding capacity after two weeks, alongside enhanced overall skin conditions including elasticity. A portion of these research findings was presented at the 36th IFSCC Congress (September 28–October 1, 2026, in Perth, Australia).

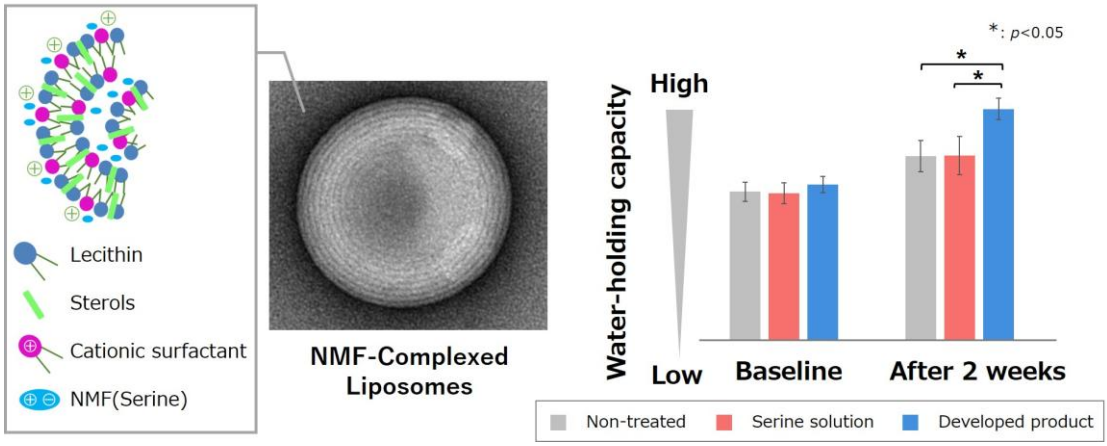


Figure 1. Changes in Water-Holding Capacity with Continuous Use of NMF-Complexed Liposomes

Research Background

The skin's inherent water-holding capacity declines with age, leading not only to severe dryness but also triggering a chain reaction of aging signs, such as diminished barrier function and loss of elasticity. The skin's hydration architecture is often compared to a brick-and-mortar structure; it is maintained when both the "stratum corneum cells" (bricks) that store moisture and the "intercellular lipids" (mortar) that prevent moisture evaporation function properly. However, delivering moisturizing ingredients like NMF deep into the stratum corneum cells requires overcoming the dense barrier of intercellular lipids. Consequently, conventional moisturizing care has struggled to simultaneously target both components. As a result, a common challenge is that when the skin's water-holding capacity is compromised by aging, the skin feels dry almost immediately after moisturizing. To fundamentally restore the skin's water-holding capacity, we applied our proprietary capsule technology to address this challenge.

Development of NMF-Complexed Liposomes

To simultaneously target both the stratum corneum cells and intercellular lipids, we focused on "liposomes," a technology the company has researched for over 40 years. Liposomes are microscopic capsules primarily composed of phospholipids—biocompatible ingredients—with alternating layers of oil and water. They possess a high affinity for the skin and significantly enhance the penetration of water-soluble ingredients that are otherwise difficult to deliver. By complexing NMF into liposomes to deeply hydrate the stratum corneum cells, while utilizing the liposome's lipid components to structurally reinforce the intercellular lipids, we aimed to address both vital targets simultaneously.

For the NMF component, the amino acid "L-serine" was selected for its excellent water-retention properties even under severe desiccating stress. Furthermore, to maximize penetration, we developed "NMF-Complexed Liposomes" by controlling the capsule's surface charge to a moderate positive (cationic) state. The multi-layered lamellar structure of this newly developed capsule was confirmed via transmission electron microscopy (Figure 1).

Penetration of NMF-Complexed Liposomes into the Stratum Corneum

To verify penetration efficacy, tests were conducted using excised human skin. Compared to an aqueous serine solution containing the same amount of serine, the developed liposomes increased the delivery of serine into the deep layers of the stratum corneum by more than 200 times.

NMF-Complexed Liposomes Enhance Water Retention in Corneocytes and Reinforce Intercellular Lipids

We examined how this technology actually affects both the stratum corneum cells and intercellular lipids. First, to confirm whether the penetrated serine exerts a water-retention function within the cells, we examined the contraction state of keratin filaments when humidity was dynamically shifted from high to low (30% RH, mimicking desert-like conditions). When keratin filaments lose moisture, they shrink, leading to a narrower inter-filament spacing—a metric used to evaluate water-holding capabilities. Skin treated with the developed product maintained a wider inter-keratin filament spacing compared to the aqueous serine solution, suggesting that corneocytes can retain water even in a dry environment (Figure 2).

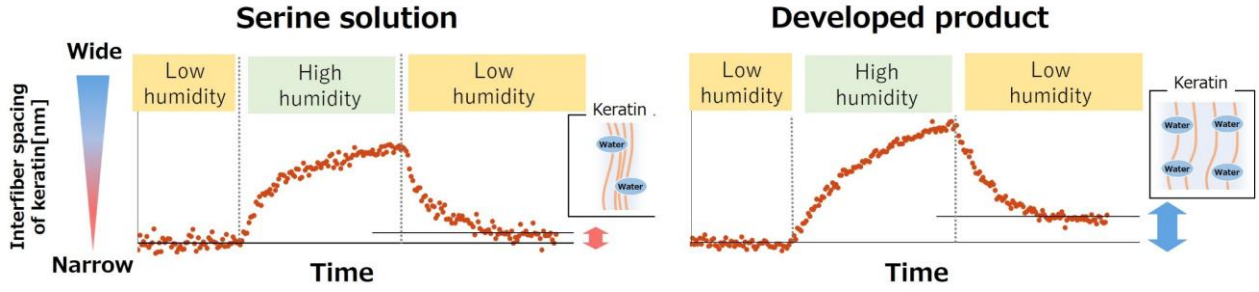


Figure 2. Dynamic Changes in Inter-Keratin Filament Spacing under Humidity Cycles

Next, to verify the physical reinforcement of the intercellular lipid matrix, Small-Angle X-ray Scattering (SAXS) analysis was performed at the large-scale synchrotron radiation facility, SPring-8. Compared

with the aqueous serine solution, human stratum corneum sheets treated with the developed product showed increased diffraction peak intensity derived from the lipid lamellar structure, which is essential for healthy skin, indicating the physical reinforcement of the barrier architecture (Figure 3).

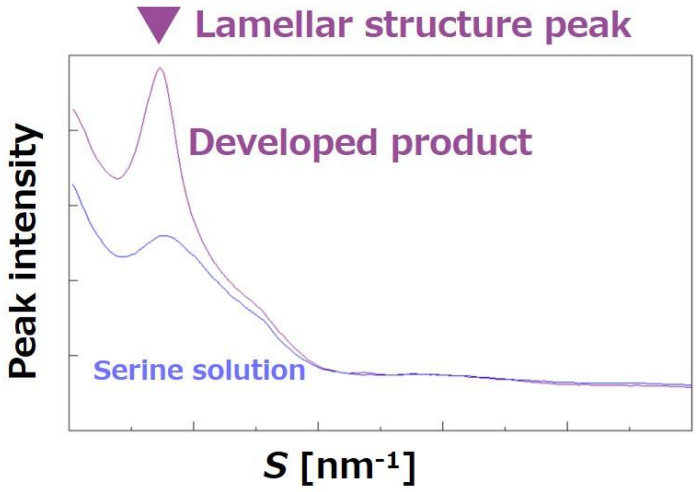


Figure 3. SAXS Profiles of the Intercellular Lipid Lamellar Structure

Clinical Proof of Functional Restoration and Elasticity Enhancement

To evaluate in vivo efficacy, a 4-week clinical trial was conducted involving 23 healthy subjects aged 60 and over, a demographic highly susceptible to age-induced dryness. The results demonstrated that the formulation not only improved skin hydration and transepidermal water loss but also significantly increased the fundamental water-holding capacity (WHC) after just two weeks of use (Figure 1). Additionally, skin elasticity improved over the 4-week period (Figure 4).

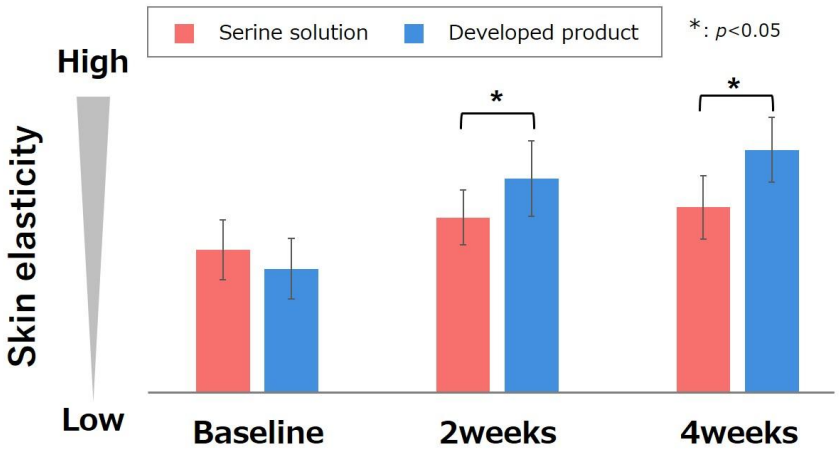


Figure 4. Changes in Skin Elasticity with Continuous Use of NMF-Complexed Liposomes

Future Outlook

Through this research, we have successfully improved the declining water-holding capacity of the skin by developing "NMF-Complexed Liposomes," which can target both stratum corneum cells and intercellular lipids. By changing the complexed ingredient, this technology is expected to address a wide range of skin concerns in addition to water-holding capacity. Moving forward, based on this

technology, we aim to encapsulate various active ingredients to deliver unprecedented skin benefits, providing products and services that contribute to enhancing customers' well-being.