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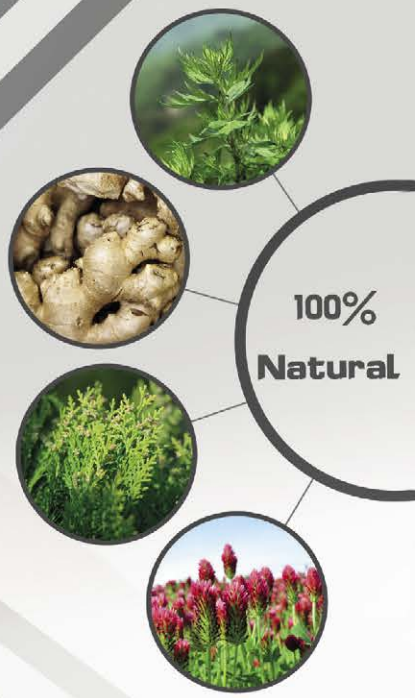

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* DPCs: dermal papilla cells

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Sea Beet for Hair & Scalp Protection

A. Momméja

"Protection" has become a common word in the cosmetic claims vocabulary. The high exposure to external stress like UV exposure, pollution or blue light, and its consequence on the body, increased the awareness amongst consumers of the importance of protection and prevention of ageing factors. The different stresses we are exposed to are now covered by the concept "exposome". This was defined by an American epidemiologist, Christopher Wild, as "all the factors to which an individual is exposed over the course of its life, from birth right through to death, incl. the prenatal stages", thus including external as well as internal stress factors. What does it mean for hair beauty?

At first, hair grows on the scalp in the hair follicles. The first stress hair can be exposed to is therefore an internal stress, like inflammation or lack of nutrients during the neogenesis of hair. Once hair grows, it starts being exposed to external stress: cleansing products, combing, UV, pollution etc. A 30 cm long hair strand is 30-months old. This represents 2 years of daily exposure to aggressors. Therefore, hair beauty really reflects how well hair was protected from stress in the long run. To achieve hair beauty, it is therefore necessary to care about a daily protection of the hair fiber as well as of the scalp. Following a bio-inspired approach, Seppic identified the sea beet (*Beta maritima*), also called the wild spinach, as a scalp & hair protector.

An ancestral plant to protect hair & scalp

The sea beet is an ancestral Eurasian edible plant growing on the seasides. The leaves have been eaten as a vegetable since prehistoric times, as evidenced by neolithic finds. Its cultivation probably began as early as the second millennium BC in the Near East. Several cultivated forms started to appear and gave birth to new species with new genetic traits over the centuries. Inside this big family of descents, we find the sugar beet, the field beet, the beetroot, the chard and many more. Nowadays, the genetic resource of the sea beet is considered precious, containing more resistance genes (to stressful conditions like challenging climate conditions or biological stress) and is used for breeding of sugar beet or other cultivated forms to strengthen them [1]. An oil-soluble extract from the sea beet, sourced in Brittany, was developed as a natural solution for strengthening hair fiber and protecting scalp.

Scalp protection

Oxidative stress is associated with many scalp disorders (dandruff, seborrheic dermatitis etc). The most common manifestation to hair emerged from an unhealthy scalp is an altered cuticle with evidence of surface pitting, roughness or breakage. The biochemical alterations observed in hair are most commonly oxidative damages of both proteins and lipids. A malondialdehyde assay was thus conducted on reconstructed epidermis exposed to UVB stress with or without treatment with the sea beet extract. From 0,2%, it demonstrated a significant reduction of lipoperoxidation (-13%) versus non treated. However, the scalp protection of the extract goes behind antioxidant action. Tested on keratinocytes exposed to UVB stress, it also exhibited significant soothing action from 0,2% by reducing the amount of inflammatory mediators like PGE2 (-13%), IL-1 (-21%) and IL-6 (-21%). Finally, it was shown that the sea beet extract protects the cell from ageing by significantly slowing down the senescence process (beta-galactosidase assay).

Hair conditioning benefits

The efficacy of the extract was tested afterwards on hair. The study included 20 women, from 16 to 50 years old, with dry & damaged hair. Volunteers applied a leave-on product containing 1% of the sea beet extract once a day on hair before combing during 28 days. The study was made versus placebo. The structure of the hair fibers was evaluated by electron microscope at different magnifications and volunteers answered a questionnaire of self-evaluation.

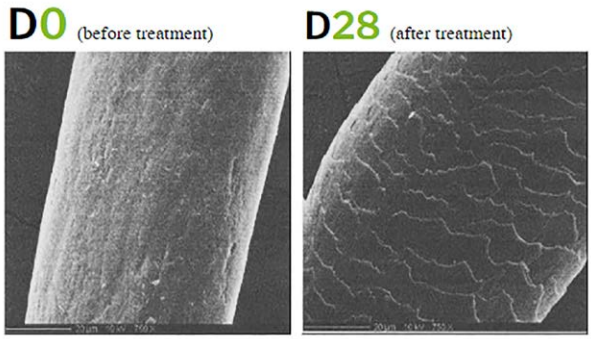

Fig. 1 Hair scales at D0 and D28 at magnification x750 (electron microscope)

As shown in **Fig. 1**, at the end of the study, the hair structure was significantly improved versus D0: +62% improvement of scales aspect (smoothing effect). The self-evaluation also allowed identifying the key benefits perceived by the consumer. Shine improvement is the benefit n°1 perceived by 100% of the volunteers (+22% satisfaction versus placebo). Easier combing is the benefit n°2 perceived by 100% of the volunteers (+11% versus placebo), while volume is the benefit n°3, perceived by 70% of the volunteers (+14% versus placebo).

The ideal solution for natural anti-aging hair & scalp care products

The awareness about premature ageing has raised a lot for several years amongst consumers. The need for protection is now perceived necessary, not only for skin, but also for scalp and hair. The bio-inspired extract from the sea beet, a traditional plant sourced in Brittany, aligns with the protection and naturality expectations of consumers.

References

[1] Beta maritima, the origin of beets (*Enrico Biancardi, Leonard W. Panella & Robert T. Lewellen*, 2012)

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Hacking Maskne: A Quorum Quenching Story

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The acne derived from mask wearing (maskne) is a global trend that was brought up along the pandemic amongst population. What is the origin? Microbes communicate with each other to coordinate group behaviors, through a specific communication system called Quorum Sensing. This system is responsible for the human microbiome health. Quora Noni hacks these bacteria communication signals, avoiding the harmful attack of microbes on the skin, that causes acne and other skin conditions. This Noni stem cell ingredient is a metabolome rich in anti-Quorum Sensing molecules, specially designed to act against bacterial dysbiosis, blocking the microbial communication signals in a natural way, stopping the development of virulence and perfecting, at the same time, the skin appearance. The active does not contain antibiotics, thus avoiding the potential development of microbial resistance, and it is also bacteriostatic, maintaining a healthy microbial balance. Several *in vitro* and *in vivo* studies were carried out to demonstrate these claims and the high efficacy of the active against acne.

Introduction

Consumer trends throughout 2020 have been shaken by the global pandemic we are experiencing. This health crisis has marked a milestone in consumer behavior patterns, and cosmetics is no exception.

Currently, due to the use of protective elements such as masks, as well as other related factors, the appearance of acne has increased among the population, no matter the age. The constant friction of the mask fabric on our skin, together with the lack of perspiration, has led to the phenomenon known as 'maskne'.

A more technical term is mechanical acne, and it is also known as 'athlete's acne' or 'friction' because it is the result of the mechanical friction of a tissue against the skin and is common in athletes.

'Actually, it is a common acne that can occur in people who never had it. The mask will be essential to protect ourselves and we have lo live with it. However, our skin is not used to it and this is one of its effects' said *Dr. Mar Mira* to BBC World magazine, specialist in aesthetic medicine and nutrition and co-founder of the Mira + Cueto clinic, in Madrid, Spain.

The maskne is something more usual in health professionals as stated in an investigation published by Journal of the American Academy. It said that at least 83% of health professionals in Hubei (China) got dermatological diseases on their face as a result of mask wearing.

Amy Kassouf – dermatologist at Cleveland Clinic (Ohio), said that the acne derived from mask wearing 'has always been a problem in health professionals who are obligated to use them. Now that its use has been spreaded to the public is when the problem has raised'. When either talking or breathing, the mask tends to trap a lot of hot air, which in addition to being annoying, creates and ideal environment for the growth of bacteria and skin mites. The friction of the mask accentuates acne breakouts, according to a report from the Cleveland Clinic.

Oily or acne-prone skin, not new but one of the biggest concerns in skin care together with an obligation that seems to have come to stay, such as the use of a mask, lead us to consider new strategies to deal with acne from a more natural way.

Vytrus Biotech proposes a new treatment based on plant stem cells, respectful with the skin microbiota, which acts on skin conditions caused by mask wearing, such as acne.

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Blocking the microbial communication

The active ingredient Quora Noni™ (INCI: Morinda Citrifolia Callus Culture Lysate) is the concentrated metabolome from Noni totipotent cells. This ingredient acts as a treatment and prevention of acne-prone skin, being a great sebum-regulator and improving skin imperfections.

However, what is the origin of acne?

Quorum Sensing (QS) is a bacterial coordination system. Bacteria use QS to carry out coordinated behaviors such as antibiotic generation, biofilm generation or bioluminescence. Environmental changes such as excess of sebum or pore-clogging in acne-prone skin cause microbial dysbiosis (microbiome imbalance). The bacterial dysbiosis promote the activation of QS and consequently the development of coordinated behaviors of certain bacterial species in the pore. Through QS, species such as *C. acnes* or *S. aureus* can coordinate the generation of biofilm or virulence factors that activate the inflammatory system of the skin, causing the appearance of skin imperfections.

This metabolome is rich in Anti-Quorum Sensing molecules (anti-Quormones), especially designed for the 'dermohacking': they act synergistically against the microbial dysbiosis mediated by Quorum Sensing and brings the activity previously described.

The plant (origin of the active) is widely used in traditional Polynesian medicine and has its origin in the islands of the South Pacific such us Tahiti of Fiji, with more than 150 actives described. Noni plant is used worldwide for analgesic, anti-tumor, and anti-inflammatory remedies. There are numerous clinical studies that validate the remarkable benefits of the plant for our health.

The mechanism of action of the active (Quorum Quenching – **Fig. 1** is based on the natural strategy of Noni and consists of blocking the bacterial coordination (QS), respecting the skin microbiota and being an alternative to the use of antibiotics.

The composition of the active is 100% natural (ISO 16128), preservative free, certified by COSMOS-Ecocert and respectful with the microbiota.

Biological acitivity

In vitro 1: Broad spectrum bacteriostatic effect

Several microorganism's species were incubated (*M. furfur, C. acnes, S. aureus, P. aeruginosa, C. striatum and E. floccosum*) with several concentrations of the active during 24h, under specific conditions for each microorganism. Viable cells were quantified at time 0 and after 24h of contact to evaluate the bacteriostatic and fungistatic activity of the active.

The result shows that the active ingredient is able to inhibit the growth and reproduction of several microorganisms (G+, G- and Fungi), maintaining the populations without destroying the microbes, demonstrating, therefore, its bacteriostatic effect (**Fig. 2**).

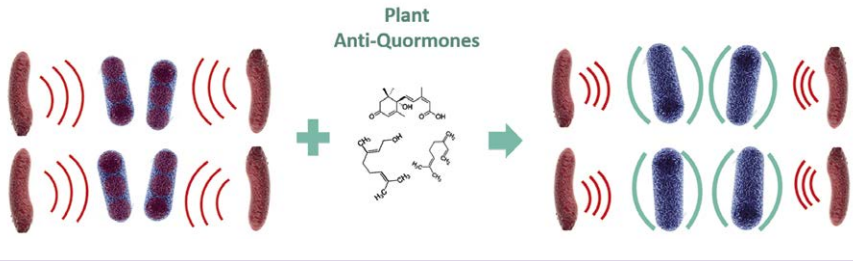

Fig. 1 Mechanism of action (Quorum Quenching).

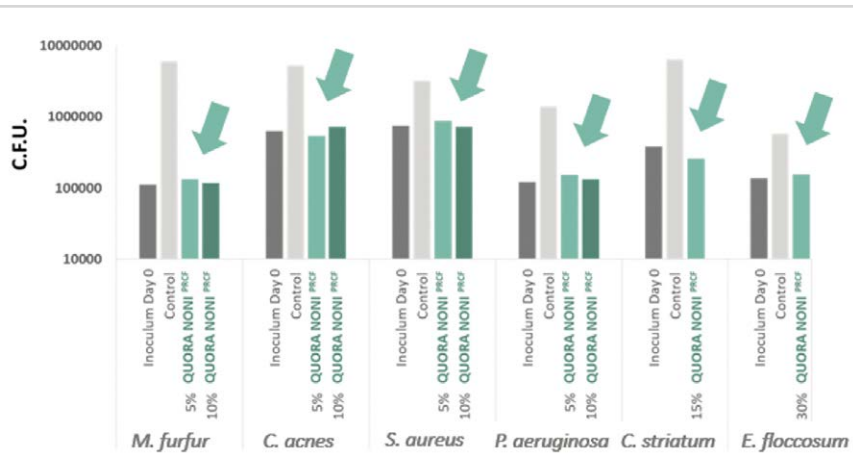

Fig. 2 Bacteriostatic/fungistatic effect of Quora Noni™.

In vitro 2: Anti-biofilm effect (anti-Quorum Sensing)

In this second assay, the anti-biofilm properties of the active were evaluated and representative biofilms were generated in *C. acnes, M. furfur, C. striatum* and *S. aureus.* The objective of the trial was the quantification of:

- Biofilm population density, measured as colony-forming units per coupon, after 24h of incubation.
- Planktonic live cells in suspension

It was demonstrated that the active significantly inhibited the biofilm formation up to 99% while preserving the planktonic cells alive, showing its antibiofilm effect on *Cutibacterium acnes* and *Staphylococcus aureus* (**Fig. 3** and **4**, respectively).

In vitro 3: Modulation of Microbial Quormones Synthesis

In order to measure the ability of the ingredient to inhibit the expression of Lux-S Gene, a key gene in the synthesis of Quormones, an experiment was specially designed: Gene expression was measured through Retro-transcription and quantitative PCR, expressing the resulting values in Cqs.

The results show that the active was able to inhibit the Lux-S Gen expression up to 89%. This means that the active has the ability to interfere very specifically in the Quorum Sensing system of *C. acnes*, by inhibiting the synthesis of Quormones, and offering a new mechanism of action.

In vitro 4: Modulation of Toll-like Receptor-2 (TLR2)

This test measured the ability of the active to block the membrane receptors TLR2 (microbe-keratinocyte connection). The ability of the activation of TLR2 of a solution of *C. acnes* lysate was measured. The TLR2 activation by fragments of *C. acnes* membrane leads to IL-α induction, which is, therefore, a marker of this interaction.

The keratinocytes were incubated during 24h with the ingredient, and the supernatant was then eliminated and cleaned, and the pre-treated keratinocytes were exposed to the *C. acnes*. IL-1α was measured by ELISA.

The active was able to decrease the levels of IL1-α up to -46% compared to control without treatment. This means that the ingredient has the ability to interfere very specifically in the microbial-keratinocyte interaction by blocking the Toll-like Receptor-2.

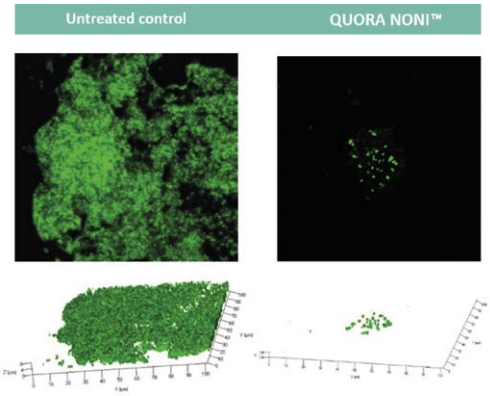

Fig. 3 Anti-biofilm effect in *C. acnes.*

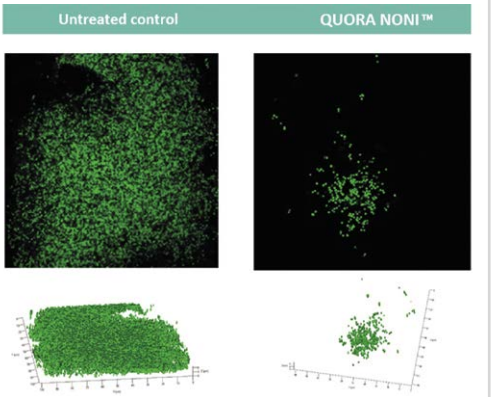

Fig. 4 Anti-biofilm effect en *S. aureus.*

In vitro 5: Anti-inflammatory activity

To measure the anti-inflammatory activity of the ingredient, Human Inflamed Monocytes (THP1) were treated with the active for 24h, and then the levels of TNF-α and IL-8 were quantified from supernatant by ELISA. The positive control was dexamethasone (reference drug).
The active completely restored TNF-α levels from inflamed cells. The effect was very potent at all tested doses, reaching up to -97%, demonstrating a higher level of restoration than dexamethasone (-56%).
The ingredient also completely restored IL-8 levels from inflamed cells. It demonstrated a high efficiency at all tested doses, reaching up to -69%. Dexamethasone restoration levels was up to -33%. This demonstrates the anti-inflammatory ability of the ingredient, even higher than dexamethasone.

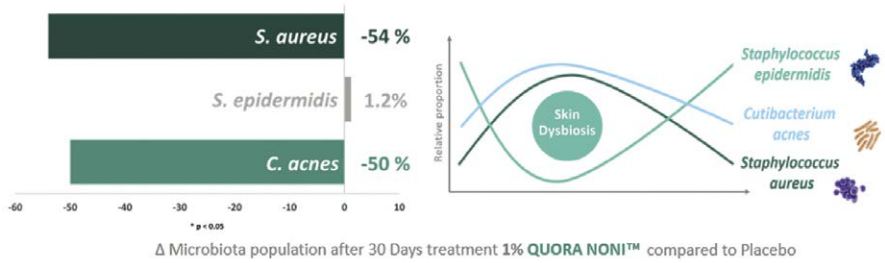

Fig. 5 Dysbiosis rebalance and Microbial quantification.

Clinical evaluation

In vivo 1: Dysbiosis rebalance

The first clinical trial was carried out with a panel of acne-prone skin volunteers (12-29 years old) where the number of skin microbial cells were quantified. The results showed that the active reduced the relative proportion of virulent bacteria (*S. aureus* and *C. acnes*), while maintaining the most beneficial microbial population of the skin (*S. epidermidis*).

This *in vivo* test shows that the active ingredient rebalances the microbiota of acne-prone skin, respecting the most beneficial commensal bacteria (**Fig. 5**).

In vivo 2: Reduction of sebum level production

To measure the levels of production of sebum, a Sebumeter SM815 was used, and the measures were taken on the forehead of the volunteers. Results show that the active significantly decreased the sebum production down to 28% at 30 days. The sebum levels went down going from an average value considered oily skin to normal skin in means of skin sebum.

In vivo 3: Pore size reduction

To measure the area with pores, the sophisticated technique Visioface® 1000D was used. The active decreased the area with pores by 48 % on average, compared to placebo, reaching up to 92 % reduction in the best case (**Fig. 6**)

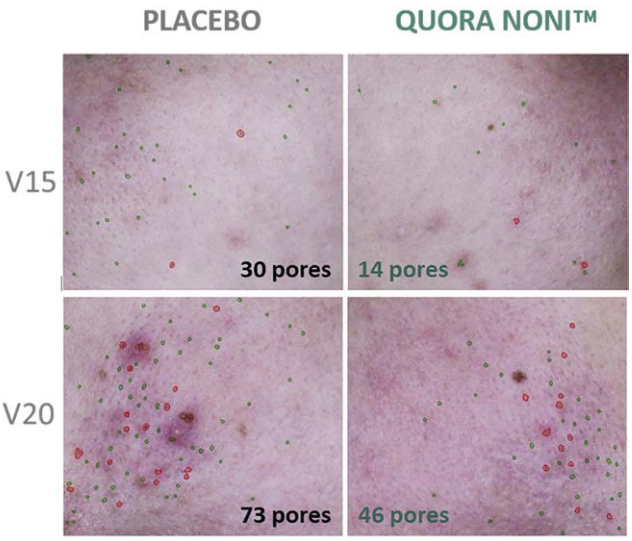

Fig. 6 Pore decrease.

In vivo 4: Dermatologic evaluation of acne lesions and HD-visioface Macrographies

To evaluate the effect of the active in acne lesions, the Spanish Scale of Acne Gravity (Escala de Gravedad del Acné Española – EGAE) was used, and physical examinations were done by a dermatologist, using a visual scale to determine the intensity and scope of the lesions. Three grades of acne were used (soft, moderate, and severe), and the evolution of comedones was evaluated.

The plant stem cell-derived active reduced the presence of open comedones by -15% on average compared to placebo, reaching up to -80% in the best case. These data and the macrophotographies taken with HD-visioface (**Fig. 7**) demonstrate the ability of the ingredient to reduce the number of lesions caused by acne, and to perfect skin surface.

Conclusion

The active ingredient Quora Noni™ brings a new mechanism of action against acne, blocking the microbial Quorum Sensing. By hacking their communication system, bacteria are not able to form biofilms and turn virulent, which prevents from the formation of acne and other skin disorders related to microbiome.
Quora Noni™ is recommended both for the treatment and prevention of acne, as well as the treatment of hair and scalp problems such as dandruff or sensitive and greasy scalp. Since it does not contain antibiotics, and its bacteriostatic properties, the potential generation of resistance by bacteria is avoided, which is usually common in other acne treatments.
Made from plant stem cells, Quora Noni™ addresses acne-prone skin care in a way that respects the skin microbiota, representing a natural and highly efficient treatment. A revolutionary mechanism of action, in line with the demand for Clean Beauty cosmetics by consumers and an ally against the maskne.

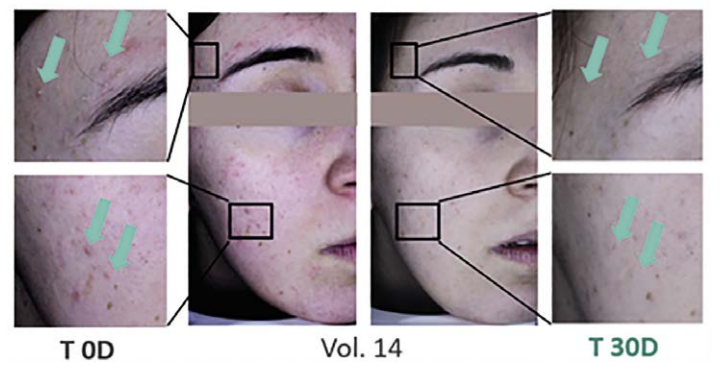

Fig. 7 HD-Visioface Macrophotographies.

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A Novel Patented Ingredient Targeting Multifaceted Mechanism for Healthy Scalp

E. Yi, D. Kuo, S. Hsieh

abstract

A healthy scalp also means healthy hair and is free from troubling scalp conditions, like itchiness, redness, oiliness, flakiness, burning or painful sensation, hair damage and hair thinning. Good scalp health is closely associated with sebum normalization, microbiota balance and low inflammation. The latest proprietary ingredient Epi-On™ developed by Corum aims to promote healthier scalp condition through its multifaceted properties to reduce sebum secretion, inhibit scalp yeast *Malassezia*, mitigate inflammation and downregulate 5-alpha reductase activity. 2% Azelamidopropyl Dimethyl Amine in serum delivered outstanding performance in clinical trial to significantly reduce sebum, redness, and dandruff after 14 days and 28 days. Advance research further indicates Azelamidopropyl Dimethyl Amine not only acts as an ideal solution for hair care formulation to help maintain scalp health and tackle scalp problems but also act as a cosmetic active to enhance skin recovery through epigenetic pathway.

Introduction

Scalp care is the new skin care, as savvy consumers gain knowledge and recognize a healthy scalp is the foundation to healthy hair. The scalp is the extension of the skin, constituted by epidermis and dermis layers, which support the hair follicle and sebaceous gland with primary function to secret sebum for lubricating and keeping skin moisturized while providing nutrition to skin flora. The scalp skin is subjected to frequent brushing and styling which can cause friction injury as well as may introduce microorganisms. Without proper care, scalp condition can deteriorate, thus leading to unhealthy scalp. A healthy scalp is free of itchiness, redness, oiliness, flakiness, burning or painful sensation, hair damage and hair thinning. The most common scalp issues include dandruff, seborrheic dermatitis, eczema, psoriasis and premature hair loss – these cumbersome and sometimes considered embarrassing issues are primarily induced by scalp imbalance, contributed by the overactive sebaceous glands, high oxidative stress, air pollution, poor nutrition, endogenous stress and/or endocrine imbalance.

Several complex mechanisms are involved to maintain a healthy scalp, and this healthy scalp require a balanced ecosystem, encompassing: (1) normalization of sebum secretion, (2) balanced microbiome with lower ratio of *Malassezia*, and (3) regulated level of inflammatory mediators. (**Fig. 1**) Once the scalp ecosystem is disrupted, the first consequence is excessive excretion of sebum. The overproduced sebum not only results in greasy hair but also acts as a food source to feed the primary dandruff-promoting fungi *Malassezia* species. Secondly, given the extra food source, more *Malassezia* thrives on the scalp, which promotes the production of inflammatory unsaturated fatty acids. Because *Malassezia* secretes the metabolic enzyme Lipase, which degrades sebum into unsaturated fatty acids and saturated fatty acids. The saturated fatty acids are essential for the proliferation and self-preservation of *Malassezia* species. Moreover, these unsaturated fatty acids, including oleic acid and arachidonic acid, irritate human skin and

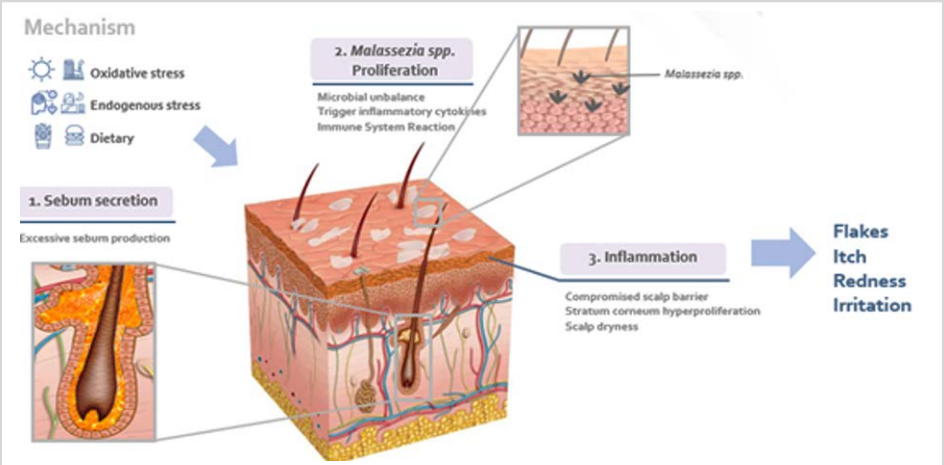

Fig. 1 Three major mechanisms of scalp problem: (1) sebum secretion (2) *Malassiezia spp.* proliferation (3) Inflammation

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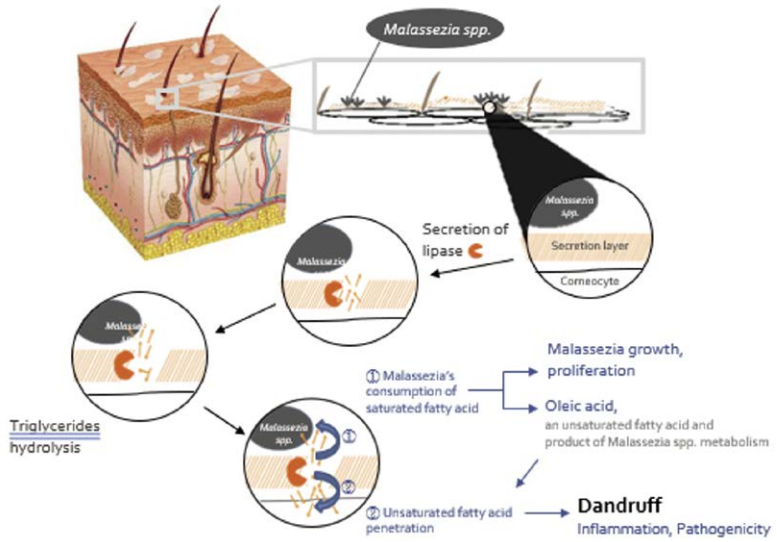

Fig. 2 The detail mechanism of lipids degradation via *Malassezia spp*. growth and dandruff production.

consequently stimulate cascade of potent inflammatory responses [1]. (**Fig. 2**)

In addition to the augmented inflammatory responses triggered by the growth of *Malassezia* species which ultimately disrupts the scalp homeostasis, the secreted sebum can also be directly oxidized by UV and other environmental stresses, which then aggravate the irritant reaction on scalp. Squalene is a characteristic human sebaceous lipid. The presence of six double bonds allows squalene to easily undergo a photo-oxidation process giving rise to squalene mono-hydroperoxide (SQOOH) [2]. Following UV exposure, squalene undergoes massive photodegradation due to its highly unsaturated chemical structure. SQOOH can further induce inflammatory responses of keratinocytes through the upregulation of numerous inflammatory genes, including ROS, COX-2, IL-6, IL8. The persistent inflammatory responses in an imbalanced scalp environment and SQOOH together trigger the abnormal hyperproliferation and accumulation of keratinocytes [3]. Lastly, the overactivity of 5-α reductase also contribute to the disrupted scalp homeostasis, since it is the enzyme that converts testosterone into its active steroid form known as dihydrotestosterone (DHT). DHT involves in sebum production and in the release of proinflammatory cytokines, and thus the excess of DHT leads to sebaceous gland hypersecretion [4].

When a series of undesirable mechanisms described above are stimulated, the scalp attempts to increase its defense system by creating more cells. This causes an irregular turnover of the scalp and shortens the cycle of skin exfoliation, which ultimately lead to flaking or dandruff formation and other scalp issues. In order to address the growing issue of scalp conditions, Corum pioneered in the development of an azelaic acid derivative Epi-On™ (INCI: Azelamidopropyl Dimethyl Amine (and) Butylene Glycol) to provide an effective cosmetic solution for scalp health through targeting the multifaceted mechanisms involved for balanced scalp ecosystem, including sebum normalization, anti-inflammation and microbiota balance.

In-vitro study: Effect of Azelamidopropyl Dimethyl Amine to reduce sebum secretion

To measure the efficacy on sebum secretion of Epi-On™ treatment, a study was conducted using Nile Red Staining method on the cell line of human primary sebocytes (HPS), which are the major cells within sebaceous glands that play an important role in sebum production and secretion. The method of Nile Read staining aims to detect the localization and quantity of intracellular lipids, particularly neutral lipid droplets within cells. In this study, primary human sebocytes were cultivated to 80% confluence and treated with 0%, 0.05%, 0.1% and 0.5% Epi-On™ (A.I.) for three to four days. Nile red was then used for intracellular lipid droplet staining, and Hoechst 33342 was used for nuclear staining. The analyzed calculated method is using ImageJ to quantify the intensity of Nile red signal and number of nuclei. Nile red signal was normalized with nuclei number in each photo. The result shows that Epi-On™ can effectively decrease intracellular lipid droplets in human primary sebocytes at both 0.1% and 0.5% Epi-On™ (A.I.) (**Fig. 3**)

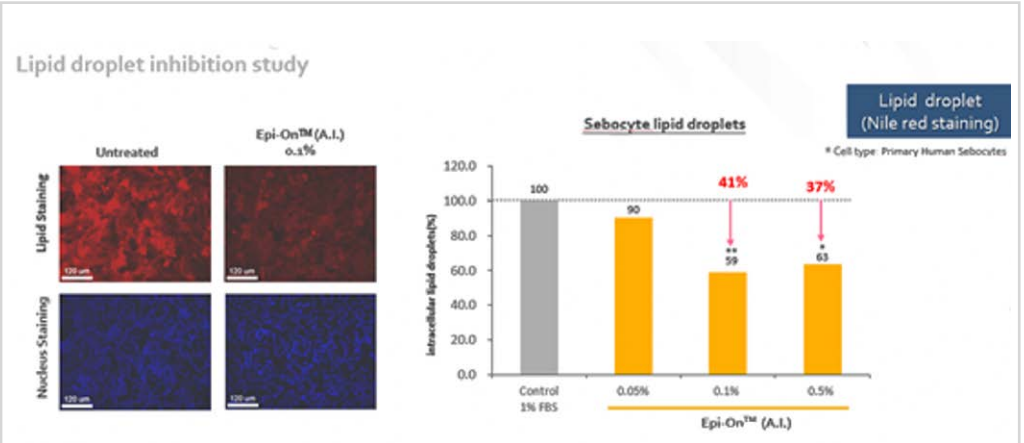

Fig. 3 Epi-On™ decreased intracellular lipid droplets in human primary sebocytes in a dose-dependent manner.

In-vitro study: Effect of Azelamidopropyl Dimethyl Amine to downregulate *Malassezia*

Because *Malassezia spp.* is a lipid-dependent yeast, believed to play a critical role in scalp health and the formation of dandruff, the downregulation of this fungi species helps restore the microbiota balance on scalp. To measure the anti-fungal effect of Epi-On™ treatment, an antimicrobial test was performed on *Malassezia spp.* in 24 and 48 hours after 1% and 5% Epi-On™ (A.I) treatment. The study was conducted by SGS Taiwan with reference to U.S. Pharmacopeia Microbiological Tests <51> for antimicrobial effectiveness testing. The result indicates that 1% Epi-On™ (A.I.) can decrease the number of *Malassezia spp.* to 56.1% and 12.4% after 24 and 48 hours, respectively, and 5% Epi-On™ (A.I.) shows even better inhibition rates with almost 95% *Malassezia* diminished after 48 hours. (**Fig. 4**)

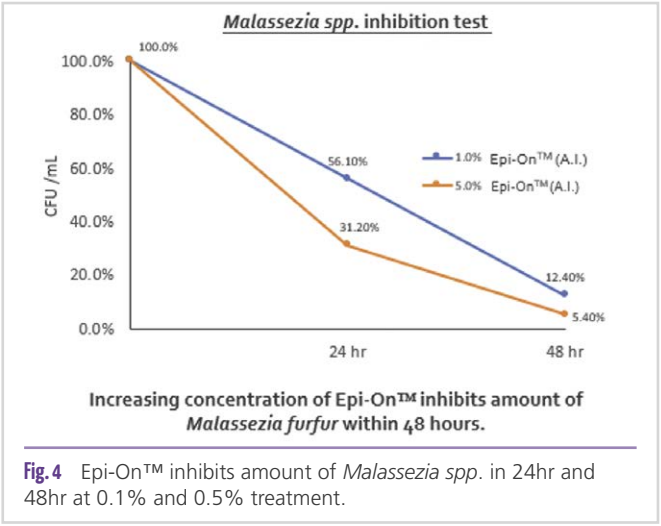

Fig. 4 Epi-On™ inhibits amount of *Malassezia spp.* in 24hr and 48hr at 0.1% and 0.5% treatment.

In-vitro study: Effect of Azelamidopropyl Dimethyl Amine to anti-inflammatory and 5-alpha reductase inhibition on the scalp

Epi-On™ attenuates inflammatory reactions

Squalene is a characteristic human skin lipid secreted by sebaceous glands to hydrate and maintain the barrier of our skin. The presence of its six double bonds make squalene highly sensitive to oxidation – it easily undergoes oxidation process to form squalene peroxides. The peroxidation of squalene has been demonstrated to promote the pathogenesis of certain skin conditions, including the formations of acne and dandruff. Moreover, squalene peroxides induced the initial upregulation of inflammatory cytokines IL-6 and IL-8. ELISA was performed on keratinocytes to measure the anti-inflammatory ability of Epi-On™ under squalene peroxides treatment. The result demonstrates that Epi-On™ significantly downregulated the protein production of IL-8 and IL-6 at 0.005%, 0.05% and 0.5% concentrations. (**Fig. 5**)

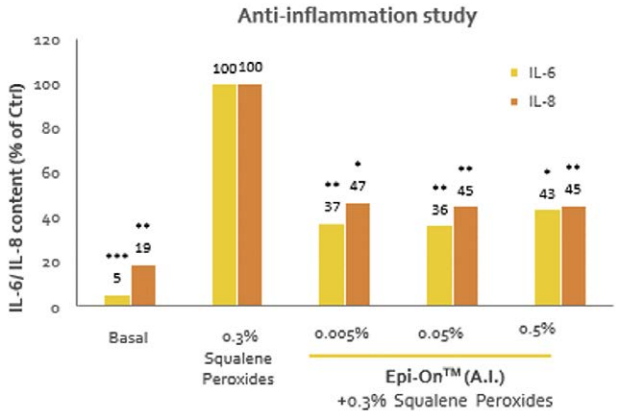

Fig. 5 Epi-On™ decreased two inflammatory cytokines IL-6 and IL-8 proteins on squalene peroxides stimulation.

Epi-On™ reduces 5-alpha reductase activity

5-α reductase is the enzyme that converts testosterone into its active form steroid dihydrotestosterone (DHT). An excess of DHT is one of the factors leading to sebaceous gland hypersecretion. The property of Epi-On™ to inhibit 5-alpha reductase activity in normal human epidermal keratinocytes was analyzed by Bioalternatives, France. The study evaluated the activity of 5-α reductase activity by detecting the level of [14C] -testosterone, and thin Layer Chromatography (TLC) was employed to separate the testosterone metabolites from other metabolites dihydrotestosterone (DHT) for analytical purpose. The result demonstrates that 0.2%, 0.4% and 0.6% Epi-On™ (A.I.) can decreased 5-alpha reductase activity in dose-dependent manner to 92%, 81% and 67%, respectively. (**Fig. 6**)

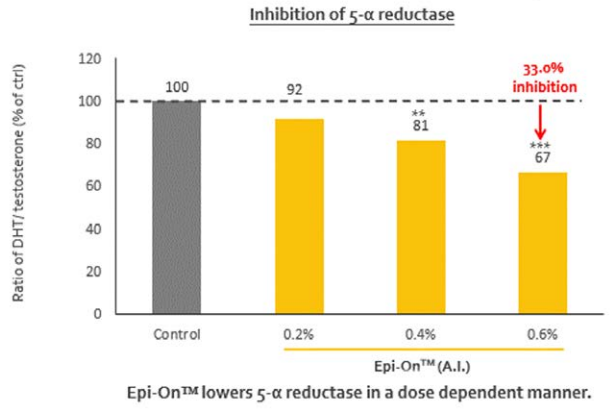

Fig. 6 0.6%, 0.4%, and 0.2% Epi-On™ decreased 5-alpha reductase activity to 67%, 81%, and 92%, respectively.

Clinical study: Azelamidopropyl Dimethyl Amine mitigate greasy scalp, redness and dandruff formation

Healthy scalp involves balanced environment with sebum normalization and low inflammation. An *in-vivo* study was conducted by Intertek, China to evaluate the efficacy of Epi-On™ in oil control, redness improvement and dandruff reduction. A total of 44 subjects (13 males and 31 females), aged between 22-58 years old, with oily scalp and dandruff issue were selected and separated into two groups to test the performance of Epi-On™ and placebo in scalp care. Other inclusion criteria include no dyed or permed hair in the past 2 months and hair equal to longer than 2 cm. Before the study, the subjects were requested to use the same shampoo every day for 14 days to balance scalp condition. During the study, the subjects applied 4% Epi-On™ serum after washing on semi-dried hair on a daily basis for four weeks. On Day 0, 14 and 28, the sebum level was analyzed, while the redness and dandruff scorings were made by investigator and through self-assessment to compare the effects of Epi-On before and after using.

Epi-On™ modulates sebum level

Sebumeter SM-815 (Courage & Khazaka, Germany) was used to measure the levels of sebum production. The result shows that, compared to placebo, 4% Epi-On™ has a much better

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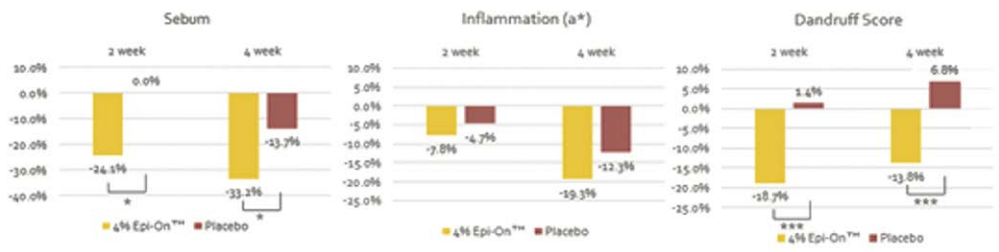

Fig. 7 Epi-On™ has a much better performance to significantly decrease the sebum level (a), decrease the redness (b) and dandruff score (c).

performance to significantly decrease the sebum level to 24.1% and 33.2% after two and four weeks, respectively. (**Fig. 7 (a)**)

Epi-On™ attenuates scalp inflammation

DermDOC HR (Derma Medical System, Austria) was used to photograph the redness of the scalp, and Image Pro Plus software was employed to analyze the redness (a*) value of scalp surface. The result indicates that, compared to placebo, 4% Epi-On™ significantly decrease the redness to 7.8 % and 19.3% after two and four weeks, respectively. (**Fig. 7 (b) Fig. 8 (b)**)

Epi-On™ reduces scalp flaking

A dandruff scoring was employed to evaluate the anti-dandruff property of Epi-On™ on a scale of 1-5 (Definition: 1 - VERY SLIGHT (observe carefully to see the microscale), 2 - SLIGHT (Mild dandruff on the scalp), 3 - MODERATE (more dandruff on the scalp), 4 -SEVERE (much dandruff, spread on scalp and hair) and 5 - VERY SEVERE (dandruff can been seen on more than half of the scalp, sticky and dry). (**Fig. 8 (a)**). The investigator selected four areas with visible condition to determine the initial scores of each subject and how the areas improved after two and four weeks. The result demonstrates that, compared to placebo where the dandruff scores increased, the dandruff scores of 4% Epi-On™ significantly decreased by 18.7% and 13.8% after two and four weeks, respectively. (**Fig. 7 (c)** and **Fig. 8 (b)**)

Subjects' self-evaluation after using 4% Epi-On™ serum

The questionnaire result confirms that, after using 4% Epi-On™ serum, 100% of volunteers felt non-irritant, 90% of volunteers noticed less pruritus on their scalp, 90% of volunteers confirmed Epi-On™ as the better product for treating itchy/oily/sensitive/flaking scalp, and 80% of users agreed the anti-pruritus/sebum balancing/anti-inflammation/anti-dandruff effects of Epi-On™ can last more than 8 hours.

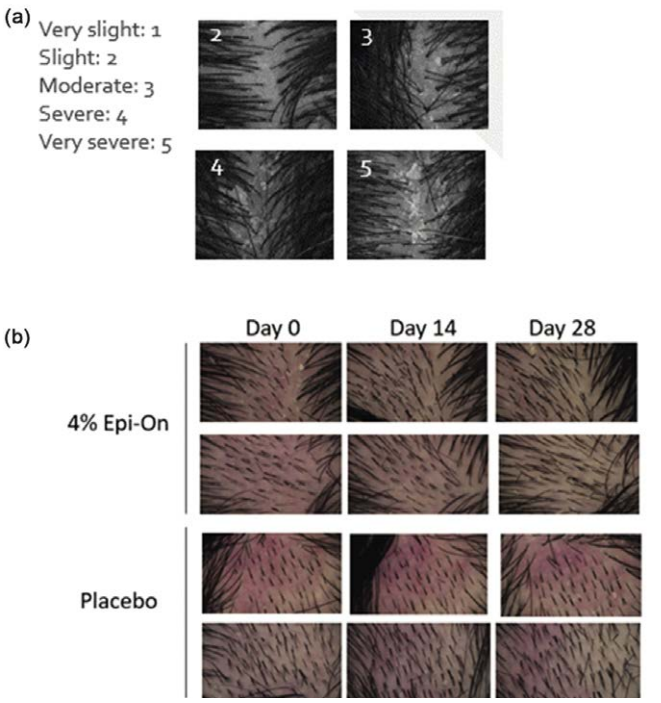

Fig. 8 (a) A dandruff score standard criteria: 1 - VERY SLIGHT (observe carefully to see the microscale), 2 - SLIGHT (Mild dandruff on the scalp), 3 - MODERATE (more dandruff on the scalp), 4 - SEVERE (much dandruff, spread on scalp and hair) and 5 - VERY SEVERE (b) Compared to placebo, 4% Epi-On™ significantly decrease the redness after 14 and 28 days.

Conclusion

Epi-On™ is a new proprietary ingredient which acts as an ideal solution for scalp health through its multifaceted properties to reduce sebum secretion, inhibit scalp yeast *Malassezia*, mitigate inflammation and downregulate 5-alpha reductase activity, and through clinical study, Epi-On™ is proven to effectively improve the condition of greasy and itchy scalp, redness and dandruff. Compared to other FDA-approved ingredients, like zinc pyrithione or ketoconazole, which aims to cure dandruff problem, Epi-On™ is safer without side effect to maintain the scalp health, and thus it can be applied on a daily basis in scalp serum, shampoo and hair conditioner. Not only Epi-On™ imparts proven results, but the ingredient is also easy to formulate with, making it the perfect cosmetic active ingredient in day-to-day scalp care products. It is water soluble and has good compatibility with other cosmetic ingredients in neutral pH range.

The COVID pandemic in 2020 significantly changed our lifestyle and social distance, and for many consumers, they have become even more health conscious. On the bright side, the pandemic has accelerated numerous developments in the field of biotechnology. Corum always invests to apply and develop new biotechnology in finding efficacious and safe cosmetic active ingredients that offer solutions to improve well-being and tackle problems faced by consumers. Scalp care is merely one of the target solutions offered by Epi-On™; there are more findings which reveal its other dermatological benefits with mechanism functioning through the new biological concept of epigenetic and supported by NGS (next-generation sequencing) research. Substantiated by cellular, ex-vivo and clinical studies in anti-inflammation, balance microbiota, cell proliferation and more, Epi-On™ demonstrates high potency to enhance skin barrier recovery and potentially mitigate sensitivity on skin, both of which are essential areas to keep our skin healthy for protection against exogenous antigens and stressors.

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Cosmetic Colorants with 2-in-1 Performance

Exploring new development approaches for an effect pigment generation by merging color and functionality into one

X. Petsitis

Today's cosmetics are highly developed products, designed to satisfy consumer's exceedingly high expectations. A renewed focus on self-care rituals calls for sophisticated functionality which translates into color cosmetic attributes such as texture, application and make-up finish. Development efforts are quickly rising to achieve a high-performance product wrapped in an attractive and stable cosmetic formulation. Given the importance of such factors as time and costs, the careful selection of raw materials is paramount. Thus, ingredients with a multifunctional performance can be advantageous and time saving during formula development.
This article describes the general formulation approach in color cosmetics with a typically high colorant content and strong focus on ideal application properties. A practical oriented section covering formulation aspects, will explain how to benefit from a new generation of color pigments that merge color effect and texture improvement into one functional unit.

Increasing consumer requirements

Many beauty addicts along with everyday consumers are using make-up products to lift their spirits and feel more beautiful and self-confident. They purchase products based on their claims which trigger high expectations. Claims involve application properties like pay-off or homogenous spreading as well as "wearing" comfort and how the applied make-up product performs – even after 8 or 10 hours. Additionally, formulations should deliver smoothing, mattifying, soft focus, long-lasting or illuminating effects. Customer satisfaction occurs once the product has effectively performed well enough to meet its stated claims. Since formula composition dictates the final product functionality, it is therefore crucial for a brand's initial and long-term success.

Color matching hurdles

Usually, formulation of color cosmetics like lipsticks, eyeshadows or foundations consists of two main parts: the initial step consisting of the development of the basic formula composition without any color pigments, followed by the second step which includes color matching for each single shade. The formula base is created to fulfill all necessary quality and stability criteria, given claims and specific performance aspects. The second step lies in the hands of the color matching experts; all shades should be developed from this one formula base. Color ranges of lipsticks or eyeshadows may consist of 10 to 20 different shades, whereas skin tone products such as foundations are created with up to and exceeding 30 shades nowadays. The color matching itself is a simple task for any experienced color expert. The most difficult hurdle is, that all shades in one range should perform in the same way, meaning pay-off, smooth and homogenous application etc. should be the same or at least similar. This is a problem that occurs inevitably because each color pigment brings its own characteristic or "behavior" into the base. Rarely only one or two pigments are used to achieve a desired result - more often a combination of up to 8 or 10 different color pigments can be needed to match a shade. Each shade composition is unique and each colorant used interconnects with the basic formula ingredients. Matte nuances don't

Mannerism of pigments

"Structure defines effect" is a fundamental maxim that is valid for all types of pigments. Colorants like chromium oxides, ultramarine blue, manganese violet, prussian blue, iron oxides and titanium dioxide etc. are very common and used in high concentrations in order to achieve highly covering matte effects. Their matte appearance lies in the pigment's own structure; they are irregular particles with a "rough" surface. Pigments with an irregular body and surface structure automatically give a visually dull appearance. Color pigments with a platy structure like pearlescent pigments have a lamellar constitution and behave completely different. Due to their smooth surface they reflect the light, appear shiny and don't agglomerate. Moreover, they improve the spreading on skin and can support a homogenous, smooth, creamy or gliding application. For an application feeling that is more powdery or soft it is possible to work with uniform spherical shaped particles. Functional fillers for example, that consist of such types of microspheres give a nice micronized skin feel which could be described as a ball bearing effect. In consequence, one can say that all regular formed, meaning platy structured or uniform spherical shaped pigments, can balance out disadvantages that might come from irregular formed colorants.

contain any pearlescent pigments and behave differently than shiny ones in which most pigments are pearls. Formula performance becomes unpredictable and each color match is turned into a challenge for the developer. The "reaction" of all incorporated colorants depends on their specific chemical composition, physical properties like surface area and oil absorption and of course the quantity used in the formula. Using 2% or 12 % of a pigment blend in a lipstick, for example, can have an extremely different impact on the final texture. In consequence, it might be that the stick becomes more dry or greasy, is harder or even brittle, which of course can influence the application properties quite strongly.

The right balance in one color range

To overcome the difficulty of getting a range of nuances with very different texture performances the cosmetic industry is using fillers that are offered in a broad variety of functionalities. For decades now, they have been used as an important element for successful color matching. These fillers can balance out each shade in terms of texture and application properties and thus help to get a harmonious color range where all shades perform in the same manner and are comparable to each other.

The quantity and type of filler is related to the specific formulation needs and can vary shade by shade. The developer needs experience to choose the right filler with the right properties to get an optimal result. As fillers are mostly transparent, they usually don't influence the final color shade. It becomes a question of time and effort to find the most efficient filler and its correct dosage.

Color shade matching and basic texture design are two different parts in formula development. All colorants have an influence on the basic texture, that's true for all decorative cosmetics. This impact can be positive or negative and it mainly depends on the use level, the application basis and the pigment's physical properties. **Tab. 1** gives an exemplary schematic overview about formulation approaches of three different groups of color cosmetics applications. Part 1 represents the formula base without colorants, fillers or any other pigments. Part 2 is the pigment part which is dominated by the influence of the colorants that are used. The ratio between part 1 and 2 is dependent on the type and total quantity of color pigments and can slightly differ from shade to shade. Depending on the required quantity of colorants and their given texture influence, functional fillers are used to improve the final texture and application properties.

The total color pigment quantity depends on the desired coverage, so higher coverage needs higher percentages of absorption colorants, which leads to an increasing dull or matte appearance. Thus, one can say that color matching and its accompanying texture impact are inextricably intertwined in all color cosmetic applications.

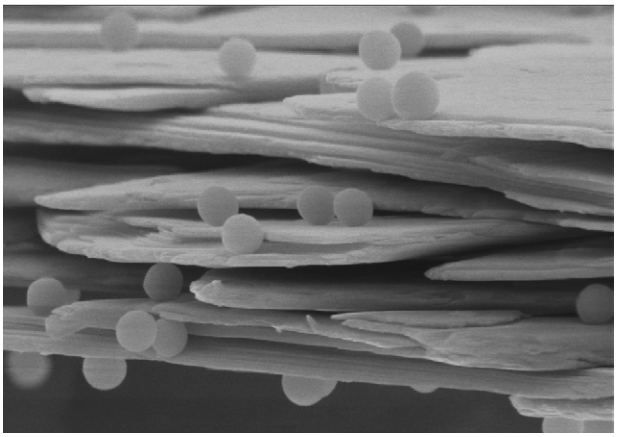

Fig. 1 Structure defines effect.

The microscopic picture (**Fig. 1**) displays a functional filler, which is based on mica (lamellar structure) and silica spheres (INCI: Mica, Silica). The platy and even surface of the mica

Lipstick	%	Eyeshadow Powder	%	Foundation	%
Part 1					
Basic wax/oil composition	~ 80	Basic filler composition incl. binder	~50–80	Basic emulsion (e.g. W/O; O/W; W/Si)	~75–80
Part 2					
Absorption color pigments	5–10	Absorption color pigments	10–20	Absorption color pigments	8–15
Pearlescent pigments	0–15	Pearlescent pigments	0–30	Pearlescent pigments	–
Functional filler	5–10	Functional filler	10–40	Functional filler	5–10

Tab. 1 General formulation scheme for three different groups of color cosmetic applications.

platelets leads to a good gliding/spreading effect and very discreet shine, while the silica spheres support the smooth application properties, acting mainly as a ball bearing component.

"Difficult" matte shades

In color cosmetics matte and covering shades usually face the problem of a dull appearance, often coming with a dry, chalky or otherwise unpleasant texture. This occurs often within pressed eyeshadow powders and other applications with high pigment levels such as lipsticks or foundations. All organic and inorganic cosmetic colorants have a high hiding power but an irregular formed particle shape. The latter is the reason for their matte appearance and dull effect.
Titanium dioxide as white pigment is mainly responsible for the coverage of a formulation and lightening of the shade. Besides titanium dioxide, iron oxides in yellow, red and black are the "backbone" of color cosmetics. They are the basis for matching natural shades and all possible skin tone nuances. Especially skin tone cosmetics should be balanced in terms of color, coverage and texture performance, which is much simpler a task for powders and wax based formulations; they can be modified by variation of fillers or adaption of the oil/wax proportion. It is more difficult to balance out emulsions, as emulsifier systems are "sensible" and all pigments usually destabilize the system. Emulsion based foundations with a high hiding power may contain up to 15% of color pigments, BB-creams that are typically more transparent rage between 5 to 10%. In W/O or O/W emulsions as well as in silicone-based systems the rough or dull character of matte pigments can turn out while spreading the formulation on skin.

Texture improvement of color ranges

Texture properties of the basic formulation can be modified through the use of thixotropic agents, functional fillers, silicones, etc. This allows for aspects like skin feel, homogenous application, softness, viscosity or pay-off etc. to be adapted to the specific recommendations. Formulators often select functional fillers to overcome setbacks with specific shades in order to modify and improve the final texture. They consist of inert particles and are easy to incorporate in each formula basis. Color matching of shades with a shiny appearance like eyeshadows for example, is generally easier because pearl pigments already impart a positive impact due to their lamellar structure and even surface (**Fig. 2**). Fine to medium sized (20-60µm) pearlescent pigments can really improve textures in terms of pay-off or homogenous application, but sometimes shiny effects are not desired. Skin tone cosmetics like foundations for example, usually don't use sparkling pigments. In this case, functional fillers are highly important to improve the texture or the application itself. Furthermore, because claims like "radiance" or "illuminating" are still gaining importance, functional fillers are playing an additional role beside texture improvement. They can directly sustain claims that focus on an appealing, healthy make-up look.

Fig. 2 The shiny effect of pearlescent pigments results from the platy structure that reflects the light like a mirror.

Skin tone color matching 2.0

Modern facial formulations should not only improve the complexion, but also be soothing, lightweight and deliver an additional radiant glow or dewy effect. Naturalness, transparency and discreet covering are fundamental requirements for BB-creams, foundations and the like. Thus, considering skin tone products, raw materials like multifunctional color pigments can deliver solutions to overstep

the disadvantages of traditional high covering colorants and facilitate the development phase. There are white, yellow, red and black pigments available that offer a 2-in-1 performance with an alluring matte and smooth color finish (**Fig. 3**). A dedicated technology paved the way to matte colorants with the beneficial functionality of regular formed pigment shapes. They are composed of iron oxides or titanium dioxide, platy mica and spherical silica. The resulting class of pigments readily includes colorant and functional fillers properties in one. It is the combination of evenly formed, platy and spherical particles that does the trick. The small particle size distribution (1-15µm) supports a very smooth and velvety skin feel that makes the difference. The uniform particle surface is the reason why they don't agglomerate, so that no milling or grinding is required. These facts all together open the path for a quicker formulation approach. One can get the desired matte shade, combined with the positive attribute of an alluring and smoothing functional filler.

Fig. 3 Appearance of the 4 different color pigments of the Ronastar® Allure series with 2-in-1 performance. (INCI: **Black:** CI77499 (Iron Oxides), Silica, CI 77891 (Titanium Dioxide), Mica; **Red:** CI77491 (Iron Oxides), CI 77891 (Titanium Dioxide), Silica, Mica; **Yellow:** CI 77492 (Iron Oxides), Mica, Silica; **White:** CI 77891 (Titanium Dioxide), Mica, Silica, Tin Oxide).

Formulation guidance

The 2-in-1 performance colorant series becomes especially beneficial for the formulation of facial skin tone cosmetics where a smooth application and a perfect looking make-up finish is required. This opens the pathway for high performance formulations like BB- and CC-creams and their

successors which usually proclaim a natural and perfect looking complexion.
The additional step of selecting a suitable functional filler to improve the texture is unnecessary. As the new pigment class includes filler functionality, the hiding power is lower compared to regular inorganic pigments. This supports the current trend look of "healthy and radiant" beauty with facial cosmetic products as opposed to the old highly covering mask-like effect.
The proceeding to translate it into such beauty products is closely related to the usual color matching. Especially for those application types 5-15% of a proportioned blend Ronastar® Allure colors can be highly efficient. The amount of white, yellow, red and black depends on the desired final skin tone. For light to medium skin shades color matching can start with yellow – red – black in ratios like 4 : 2 : 0.5. Ronastar® White Allure is used to lighten up the shade – not to deliver coverage like with titanium dioxide. The final formula offers a natural transparency and a smooth finish compared to formulations based on regular inorganic pigments without additional selection of a texture improving functional filler. The evenly formed colorant particles especially contribute to the final make-up finish: the lamellar and very even mica structure leads to a very subtle illuminating effect that is visible after application and allows to support marketing concepts focusing on glow, radiance or illumination. This appearance can clearly differentiate the product's perception compared to a conventional formula composition.
Finally, this new pigment generation offers opportunities for the improvement of existing formulations such as highly covering foundations. In this case, a part of the pigment content consisting of titanium dioxide and iron oxides can be exchanged with a certain amount of a proportioned blend of the Ronastar® Allure colors.
Example: Assuming the regular pigment content of the formulation is 15%, which usually results in a highly covering application, the colorant ratios respectively total quantity can be modified in various ways to improve the final make-up look. To support the naturality the 15% can be replaced by a combination of 7% of the regular pigments and 8% of a Ronastar® Allure blend. Another approach can be to reduce the 15% of regular pigments to 5% and add 10% of an appropriate blend of the new color pigment generation. This will reduce the coverage more dramatically and lead to a visible radiant and subtle glow.

Summary

Demanding cosmetic requirements and less time for formulation development foster the need to use multifunctional raw materials. In color cosmetics development the most important phase and crucial step is the ingredient selection. This affects in specific the color pigment composition that should be harmonized with the basic formulation for each shade variant. In this abstract, new ideas to formulate color cosmetics are given. The example of skin tone applications illustrates, how to profit from a new colorant generation, that offers a 2-in-1 performance concerning texture and color effect at the same time.

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Validation of Cleaning and Hygienic Filling Processes

S. Beckmann, A. Boye, P. Muranyi, A. Springer, J. Wunderlich

abstract

Cleaning of plants as well as hygienic filling are essential processes for ensuring product safety. However, many cleaning processes have been determined empirically and offer enormous potential for saving resources. The use of specific sensors enables a control of the cleaning success and in this way a specific optimization of the processes with regard to the duration, frequency and use of cleaning media. A microbiological validation of sterilization and hygienic filling systems also serves as proof of process efficiency and as a basis for further optimization steps. For this purpose, microbiological challenge tests are carried out using specific test organisms. Resistance-tested bio-indicators are a prerequisite for proving the real efficiency of sterilization processes.

Introduction

Manufacturing and filling processes in cosmetic industry require a high degree of flexibility due to small batch sizes as well as frequent changes of formulations and packaging. Furthermore, frequent products changes pose a challenge to the cleaning and sterilization processes. Preservatives are often used for the microbiological stabilization of cosmetics, but many artificial additives (e.g. parabens) are criticized. Therefore, there is an increasing demand for natural cosmetics and products without synthetic preservatives. The requirements for the formulation of natural cosmetic products are based on the established labels such as Nature, ECOCERT or COSMOS and other certifications such as organic or vegan. This results in a strong limitation of the possible active ingredients. It is true that multifunctional active ingredients can be used, which also have an antimicrobial effect in addition to their effect on the skin (e.g. moisturizing, perfuming). However, when using these substances, restrictions in the choice of the pH value, the used concentration, the manufacturing process and the spectrum of activity have to be considered. For example, 2-phenylethanol is effective against gram-negative bacteria and mold, but only to a limited extent against gram-positive bacteria and yeasts, while glyceryl caprate is very effective against gram-positive bacteria, but not against mold [1]. The increasing restrictions of synthetic preservatives in the cosmetics sector and the trend towards natural cosmetics place high demands on the hygienic production and filling of the products.

In addition to the challenges on hygienic processing, many manufacturers also face the task of reliable cleaning. Certain brands avoid ingredients such as silicones, paraffins, mineral oils, micro plastics, fragrances or animal raw materials in their products. During the production and filling, the transfer of residues from conventional into natural cosmetics has to be avoided. CIP (Cleaning in Place), SIP (Sterilization in Place) and WIP (Washing in Place) processes are usually applied to clean production and filling systems. Although the most extensive cleaning process also offers the best hygienic conditions, it is correspondingly resource and time consuming.

Sensor systems increase cleaning efficiency

Because of the growing variety of products and consequently smaller batch sizes, up to 30 % of the water consumption, 15 % of the energy costs and 25 % of the total system running time are used for cleaning [2], [3]. Even though a large part of the cleaning systems, especially the container cleaning, has already been automated, the design of the cleaning system is largely based on experience. The cleaning system is designed to predict the worst-case scenario and is therefore provided with high safety margins. The consequences are long cleaning times and high consumption of cleaning chemicals, water and energy.

In this context, sensor systems that adapt the cleaning process according to the cleaning task could contribute to massive savings of resources. These sensors record the cleaning progress on a macroscopic level and, in addition to the customized adjustment of the cleaning process, enable automated documentation and validation of the cleaning success. The CIP process is followed by a sterilization process, especially in case of hygiene-critical products and production environments.

Macroscopic cleaning validation

In open production environments, the random check of the cleaning success usually takes place via a visual and manual control by the responsible system operator or cleaning operator respectively. Additional contact tests are occasionally carried out at critical control points (see HACCP). However,

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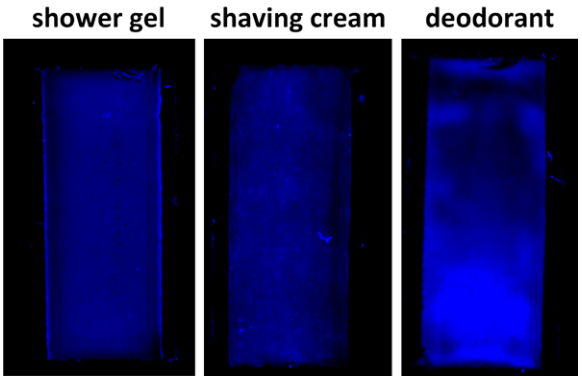

Fig. 1 Comparison of the optical detectability of cosmetic products under UV light at an excitation wavelength of 365 nm.

there is a lack of technologies for a large-scale and automated control of cleaning processes, which provide a quantitative and validated result. There are currently only a few options for an inline cleaning control of closed, non-immersed systems such as production or storage containers. A contamination sensor system that can be used for both, the open and closed non-immersed containers, will be explained in more detail below. Turbidity or conductivity sensors that detect contaminations in the cleaning agent are normally used and installed in the drainage area or pipe. However, there are critical areas in which the contamination is only removed slowly or the contamination adheres throughout the entire process. In this case, the drainage sensors provide incomplete information about the cleaning progress, since no or only little contamination can be detected in the draining cleaning agent. A promising solution is the use of optical inline sensor systems that make use of fluorescence. The UV light emitted by the sensor stimulates certain components such as proteins, vitamins or oils, which then emit light of certain wavelength. A camera built into the sensor captures this light and a digital image processing method analyzes the residual contamination. This makes it possible to localize the residual soiled areas and to determine the remaining amount of contamination. **Fig. 1** shows different cosmetic products under UV light exposure.

In order to determine the suitable wavelength for the detection of a contamination with the fluorescence method, the Fraunhofer IVV in Dresden carries out fluorescence spectroscopy for the relevant products. In this way, the suitability of specific UV sensors for different products can already be determined on a laboratory scale and adapted according to the results. An exemplary selected shower gel shows a clear emission peak in the visible wavelength range when excited with UV radiation around 350 nm (**Fig. 2**).

Fig. 3 shows the comparison of the optical detectability of shower gel under daylight (left) and UV light (right) at an excitation wavelength of 365 nm. It clearly shows that the use of UV light enables a significant increase in the optical detection of this product.

The sensors can be integrated into the tank via various standardized interfaces such as flanges or pipe connections. Process-specific adaptations are also possible. Depending on the optics and UV lighting used, the sensor system can capture a sub-area of different sizes on the inner tank surface. With regard to critical areas that are particularly difficult to clean, the cleaning progress in this area can be used as a reference for the entire tank. The cleaning progress is determined and quantified from the recorded image sequences (**Fig. 4**) by using digital image processing.

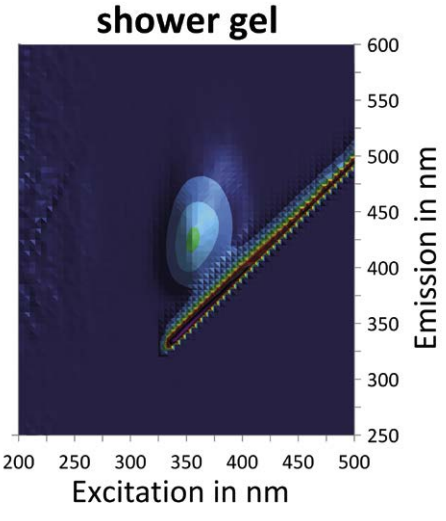

Fig. 2 Results of a fluorescence spectroscopy of an exemplary selected shower gel.

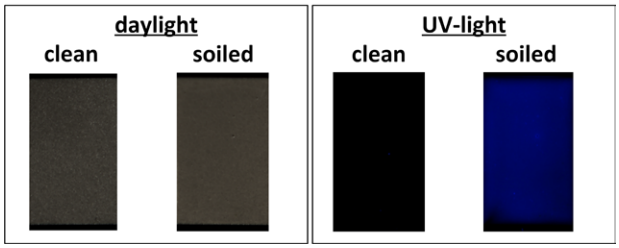

Fig. 3 Comparison of the optical detectability of an exemplary shower gel. Left: Daylight image where the contamination is almost transparent and only the underlying stainless steel surface is observable. Right: Image of the fluorescence contamination sensor where the shower gel contamination can be detected completely in blue (clean areas appear black).

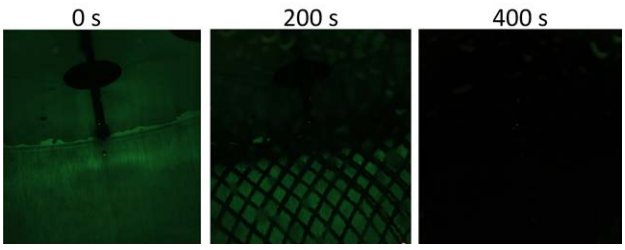

Fig. 4 Image sequence recorded by a fluorescence sensor during cleaning in a 10,000 L tank.

With the integration of such an optical, fluorescence-based inline contamination sensor, specific cleaning processes can be designed, which allows enormous savings potential. In perspective, the sensor information can be used to create an extended process model that, as part of an intelligent, self-optimizing process control, enables an even more specific adjustment of the cleaning process through inline variation of the operating parameters. In this way, the process efficiency can be maximized. In such a model, an operator can also determine whether the cleaning process should run in a short time or in a particularly resource-saving manner. Such an intelligent cleaning system has already been implemented as a prototype in the AiF / IGF project „Adaptive tank cleaning" and is currently being further developed at Fraunhofer IVV in Dresden together with FAU-Nurnberg-Erlangen in the follow-up project „IoT-CIP" .

The optical fluorescence contamination sensor is also used at the Fraunhofer IVV in Dresden for comparative cleaning tests of machine assemblies and components. This enables a quantitative comparison of the cleaning of e.g. hygienically designed assemblies with their non-hygienic counterparts. In a first step, both assemblies are soiled in a defined manner with a test soiling and then cleaned by using a reproducible spray cleaning process. The cleaning process is continuously recorded via the fluorescence contamination sensor, which delivers a spatially resolved time course of the residual contamination for the entire cleaning period. (**Fig. 5**)

Overall, the aim of the macroscopic cleaning validation is a fundamental evaluation of the cleanability or removal of contaminations. This is a prerequisite for following disinfection and sterilization processes in case of hygiene filling.

Microbiological validation of aseptic filling machines

In order to ensure the microbiological safety and shelf life of cosmetic products without preservatives, aseptic filling is an established approach in special packaging systems (e.g. airless dispensers, ampoules, sachets). In general, aseptic processing means an inline process in which sterile goods are filled into sterile packaging without recontamination. Long-life products can only be achieved if - in addition to packaging material and filling goods - product-handling machine parts as well as the filling area are sterile and shielded from the surrounding area. Aseptic processes are required for products with a high water activity and a pH value above 4.5, which should be stable for months without any cooling. In practice, chemical agents such as peracetic acid and hydrogen peroxide (in combination with heat) or saturated steam are the most common sterilization agents for packaging materials and systems. With regard to the minimum requirements for aseptic packaging machines, there are still no legal requirements in the European Union [4]. However, for aseptic filling of liquid and pasty foods, there are practical recommendations from professional associations, such as the Association of German Mechanical and Plant Engineering (VDMA) [2]. Accordingly, aseptic systems must reliably inactivate microorganisms, including bacterial endospores. As evidence, the reduction of a suitable test organism by at least four orders of magnitude in the interior of the machine and on the surface of the packaging material or five orders of magnitude on the filler is required [5].

Quantification of the inactivation performance

In order to determine the sterilization efficiency of aseptic filling systems, a practical validation is carried out in the form of microbiological challenge tests. The performance of the sterilization unit for the packaging and the processing area is verified – for example in the development phase or when the filling lines are put into operation on site – in order to identify possible weak spots in the filling process and to obtain information on the overall hygienic condition of the system [6].

Since the measurement of physical and chemical process parameters in the filling plant is rather challenging, empirical data in form of practical microbiological validations is required. In case of hydrogen peroxide sterilization, process-related temporal and spatial concentration gradients caused by irregular condensation on the surfaces of the packaging materials and systems can be found. Such fluctuations are difficult to measure and may affect the sterilization efficiency. Modeling simulations for the theoretical determination of the reduction rate is hardly worthwhile due to the low production numbers of tailored filling systems. Furthermore, the practical determination of microbiological failure or unsterility rates from a defined number of samples is extremely elaborate. For statistical certainty, a very large number of filled units have to be produced and examined. Another drawback here is the

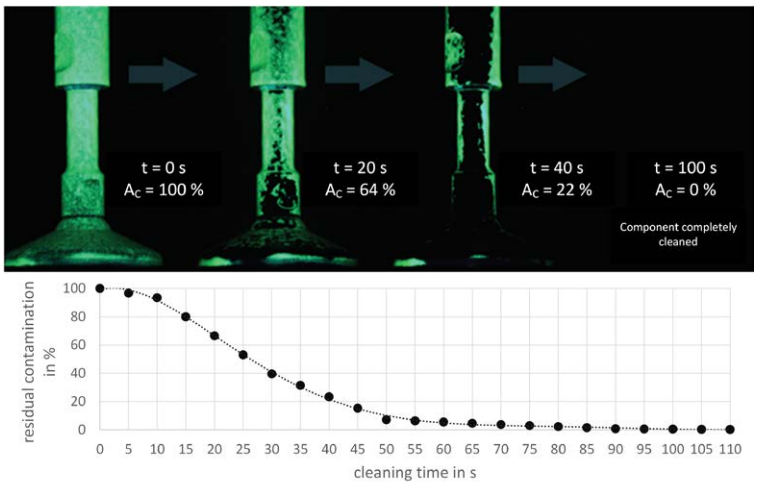

Fig. 5 Cleaning of an assembly at different times with indication of the percentage of residual contamination.

[1] https://www.fei-bonn.de/gefoerderte-projekte/projektdatenbank/aif-18820-bg.projekt
[2] https://www.fei-bonn.de/gefoerderte-projekte/projektdatenbank/aif-21507-bg.projekt

missing differentiation between filling unit and machine room sterilization (SIP), which would allow an identification of weak spots. Unsterility rates are always only based on the assessment of the final product [4].

Bioindicators are the tool of choice for the microbiological validation. These are artificially contaminated carrier materials using selected test organisms that are highly resistant to the sterilizing agent but without pathogenic properties. They enable to quantify the inactivation efficiency by comparing the initial load with the number of surviving microorganisms after the sterilization step. For this purpose, bacterial endospores or mold spores are used, as these are permanent forms with high resistance to numerous physical and chemical stressors. The VDMA has recommend specific test strains for various sterilization processes, such as Bacillus subtilis DSM 4181 for hydrogen peroxide [7], [8], [9]. In addition to the methodical approach, the result and thus the success of a microbiological validation highly depends on a defined resistance of the test organisms used [4].

Proved resistance of test organisms

Until a few years ago, it was assumed that a consistent resistance of microorganisms against a specific sterilizing agent is ensured by selecting a specific strain of a species. Studies at the Fraunhofer IVV revealed that this is not sufficient: In various batches of spore suspensions of the same bacterial strain, considerable fluctuations in resistance were found [4].

Fig. 6 shows the inactivation kinetics for endospores of Bacillus subtilis DSM 4181 against hydrogen peroxide in dependency of different batches of spore suspensions. Despite the experimental parameters being kept constant, the endospores of suspension 1 showed a significant lower resistance. Such deviations in the spore resistance can lead to an incorrect setting of the sterilization process and thus to insufficient sterilization of the packaging or the processing chamber. Consequences of such an undersized process can be an economic damage due to product failures or a health risk for the consumer [6]. The reasons for the observed fluctuations in resistance behavior are versatile. It has been shown that parameters such as the incubation temperature or the properties of the medium during spore cultivation (pH value, aw value) can have a significant impact on the resulting resistance of the endospores [10], [11], [12]. For the practical validation it can be concluded that the strain and the type of microorganisms alone does not represent a sufficient criterion. Instead, a defined resistance of the spores used must be the benchmark [4].

As part of the public funded project "ProveResist" (BMBF), Fraunhofer IVV has developed a method for determining the resistance of bacterial endospores in the dry state against liquid hydrogen peroxide and peracetic acid. Microbiological validations of hygienic filling machines that were carried out at different times or by different institutions can now be properly compared based on defined resistances of the bacterial spores. Hence, the quality of such tests is significantly increased, especially regarding the reliability of the results and the considerably reduced risk of incorrectly designed sterilization processes. Fraunhofer IVV offers microbiological validations of hygienic and aseptic filling systems with resistance-proved bioindicators, in the development phase or during on-site commissioning [6].

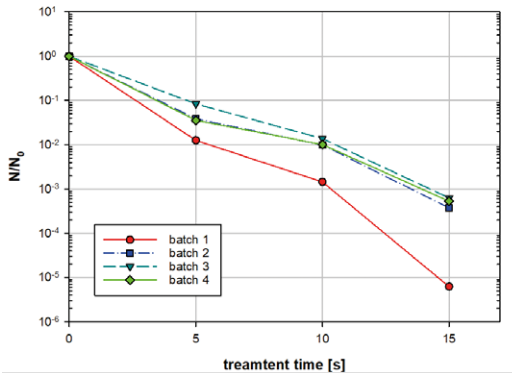

Fig. 6 Deviations in the inactivation behavior of different spore suspensions of Bacillus subtilis DSM 4181 against hydrogen peroxide, measured with a resistance test developed at Fraunhofer IVV (H_2O_2 solution: 35%, temperature: 55 °C, treatment time: 15 s). The higher sensitivity of the spore suspension 1 compared to the other suspensions is clearly evident [4].

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Antimicrobial Laundry Textiles through Repetitive Treatment with Antimicrobial Agents in the Washing Process

K. Henning

abstract

A method of treating textiles with an antimicrobial agent over a plurality of wash cycles, each consisting of a wash cycle and a subsequent treatment cycle, by dispensing the textile with a solution of a predetermined concentration of an antimicrobial agent containing a metal ion such as silver ions.
The concentration is not sufficiently high enough in the first wash cycle to achieve a predetermined antimicrobial efficacy for the textile, but sufficient to achieve the predetermined antimicrobial efficacy for the textile due to the combination of the first wash cycle and one or more subsequent wash cycles. This process can reduce the antimicrobial load of the entire laundry inventory by 50 to 90%.

Laundry hygiene in the institutional sector

Microbial contamination of textiles can contribute to the spread of infectious diseases, including healthcare-associated infections, which are among the leading causes of preventable death in the United States and are associated with a significant increase in healthcare costs each year. In general, microbial contamination can cause unsightly stains and unpleasant odours on laundry.
Therefore, to provide a textile with antimicrobial properties, the textile has been treated with an antimicrobial agent during the textile manufacturing process. For example, the fibres of the textile are embedded or coated with antimicrobial agents during the manufacturing process. In this case, the total amount of antimicrobial agent is fixed to the fibres of the textile at the time of textile treatment, and the effectiveness decreases over time as the antimicrobial agent in the fabric is washed out during washing and is not regenerated. This approach has therefore proved unsatisfactory for textile users.
In addition to these efficacy/performance issues, these products require investment, so hospitals and other healthcare facilities have a large initial investment to make to purchase new antimicrobial-impregnated linen inventory and dispose of existing inventory. Furthermore, the antimicrobial-treated products may have a visually stained discolouration, feel uncomfortable to the touch and are notoriously difficult to wash, dry and press.
This is achieved by treating a textile with an antimicrobial agent over a plurality of wash cycles, including a wash cycle and a treatment cycle. The method comprises the steps of

a) introducing a textile into a washing system for a first wash cycle
b) initiating a wash cycle with a wash agent
c) initiating a post-wash treatment cycle including the addition of a solution having a predetermined concentration of an antimicrobial agent containing a metal ion to the textile and repeating steps (a) to (c) for each of the additional wash cycles, wherein the predetermined concentration is insufficient to achieve a predetermined antimicrobial efficacy for the textile as early as the first wash cycle but is sufficient to achieve the predetermined antimicrobial efficacy for the textile in combination of the first wash cycle and one or more of the subsequent wash cycles. The treatment cycle may be a rinse cycle.

Antimicrobial effectiveness of textiles through infused silver ions

The silver ions infused in the textile fibre are infused with at least 0.6 mg of metal ions per kg of textile to achieve a predetermined antimicrobial activity.
The particulate metal ion composition may be in dry or liquid form or may be encapsulated in solid or semi-solid encapsulated form. The antimicrobially active particles are impregnated and entrapped with one or more metal salts. For example, the metal salt comprises a silver ion (e.g. silver nitrate) or a copper ion. The counterion may be any metal salt counterion, such as nitrate, sulfate, fluoride, carbonate, chloride, and the like. For example, the metal ion and the counterion may be silver sulphate, silver nitrate, silver chloride, copper sulphate, copper chloride, copper nitrate.
The majority of washing cycles consists of at least three cycles to achieve the predetermined concentration in the textile. The predetermined concentration is such that a level of the antimicrobial agent infused into the textile is less than 0.5 mg of metal ions per kg of textile in response to steps (a) to (c) performed for the first wash cycle. The predetermined

concentration is 0,5 mg to 50 mg of antimicrobial agent per kilogram of textile.
In an exemplary method, the textile material with the antimicrobial solution is dispensed by diluting a concentrated metal ion solution in a container of the washing system containing the textile material. The dilution is performed by transferring the concentrated metal ion solution into the container at a rate of about 1 to 30 ml/s. The concentrate may be transferred over a dosing period of 15 to 120 seconds. In some cases, the dosing may include different or multiple dosing rates, for example transfer rates between 5 to 1000 ml/min.

Taking water quality into account

In a further aspect, the method relates to determining or taking into account the quality of water for treating a textile with an antimicrobial agent, taking into account the quality of the water used in the method. To this end, a determined amount of the first antimicrobial solution to be transferred is transferred from the first container to the second container, based on the measured quality of the water, in step (d) to infuse the textile with the antimicrobial agent. In one embodiment, steps (a) to (e) may be performed for an initial wash cycle and steps (b), (d) and (e) are repeated in a plurality of subsequent wash cycles.

Germ transmission through bed sheets and patient gowns

Another aspect concerns the protection of the laundry supply chain. It is well known that healthcare-associated infections are a growing problem, as some pathogens are virtually untreatable by conventional methods. In such healthcare-associated infections, the harmful microbes are often transmitted in the bed linen and clothing used in a hospital.
It is well known that conventional washing methods are unreliable in disinfecting linen effectively. Even if these methods were effective, hospital textiles could become re-contaminated after they have been washed and treated. Pathogens transmitted from these textiles can infect hospital patients and even cause death.
Since most hospital patients spend the majority of their time beneath the sheets of a hospital bed or in a hospital gown, hospital bed sheets are the core of the entire hospital environment for the patient and a major source in the fight against infections. To combat such infections and protect not only patients, but also healthcare workers and anyone who comes into contact with hospital laundry (including laundry staff), the inclusion of an antimicrobial agent in an inventory of a linen from a healthcare facility can protect the entire supply chain for such an inventory.
The antimicrobial agent not only kills pathogens in soiled laundry during the washing process, the agent infused into the textiles protects the textiles from new pathogens that come into contact with the textiles. This treatment can also act as a textile preservative, protecting textiles from storage-based microbial and fungal growth.

Protection against infections when coming into contact with bed linen in healthcare facilities

To protect against infections when coming into contact with bed linen in healthcare facilities all washable, non-disposable textiles with which both patients and healthcare workers come into contact are collected in batches. These are washed using a washing system using a detergent. Each batch is then treated with a treatment solution containing a predetermined concentration of an antimicrobial agent to reduce the microbial load of the textiles in the batch and improve the resistance of the textiles in the batch to microbial contamination for healthcare-associated infections. By treating essentially all washable, non-disposable textiles in a healthcare facility, healthcare-associated infections can be reduced. In addition, microbial release into the environment can be reduced.
With this process, the antimicrobial load of the entire laundry inventory can be reduced by 50-90%.

Detection of the effective amount of silver in a textile

To determine whether textiles have been subjected to antimicrobial treatment, two solutions are used to detect the presence of an effective amount of silver in a textile, a first solution and a second solution. The first solution contains the following reagents: cadion 2B (CAS No. 6708-61-8), a buffer sufficient to maintain a pH in the range of about 8 to about 10, and a surfactant. The second solution contains cadione 2B, a buffer sufficient to maintain a pH in the range of about 8 to about 10, a surfactant and a complexing agent. The detection is based on the formation of a complex of the complexing agent and silver, the formation of the agent/silver complex being more favourable than the formation of a complex of cadion 2B and silver. The solutions are distributed to separate areas of the textile and the colour of the dispensed first solution is compared with the colour of the dispensed second solution.
Solution A in contact with a silver impregnated textile results in a visible colour change of the solution due to the formation of a red-purple complex of cadion 2B and silver, while contact of solution B with a silver impregnated textile results in no visible colour change from complexing agent and silver. A difference in the colour of solution A and solution B after delivery to a textile indicates the effectiveness of silver.
Solutions A or B contain cadion 2B in a range of 0.001 to 0.005 wt%, 0.002 to 0.004 wt% or 0.002, 0.003 or 0.004 wt%.
Solutions A and B may contain a masking agent to mask with chemical species that may interfere with the detection of silver. The masking agent may be ethylenediaminetetraacetic acid (EDTA), cyclohexanediaminetetraacetic acid (CDTA), diethylenetriaminepentaacetic acid (DTPA), nitrilotriacetic acid (NTA) or N-(hydroxyethyl)ethylenediaminetriacetic acid (HEDTA). Solutions A and B contain the masking agent in a range of 0.5 to 1.6 wt.%, 0.9 to 1.2 wt.% or 0.9 to 1.0 wt.% or 1.1 wt.%.
Solution A or B may contain a water-miscible organic solvent, such as N-methyl-2-pyrrolidone, polyethylene glycol 400 (PEG 400), N,N-dimethylacetamide (DMA) or dimethylsulphoxide (DMSO). The water-miscible solvent may be present in an amount of 2.5 to 3.2% by volume or 2.7 to 3.0% by volume or 2.7, 2.8, 2.9 or 3.0% by volume.
The nonionic surfactant present in solutions A or B may be TWEEN 20, TWEEN 80, TRITON X-100, n-dodecyl-βD-maltoside (DDM), digitonin, sarcosyl or sodium dodecyl sulphate (SDS). The amount is 0.5 to 1.4% by volume, 0.75 to about 1.15, or 0.8% by volume, or 0.9, 1.0 or 1.1% by volume.
To adjust solutions A and B to pH 8 to 10, potassium tetraborate, sodium borate, citric acid, sodium citrate, hydrochloric acid, sodium hydroxide, sodium carbonate, sodium bicarbonate, monosodium phosphate, monopotassium phosphate, dipotassium phosphate or potassium chloride may be used as buffer substances.

Examples

Example 1 Silver treatment of hospital textiles

The process described for applying silver ions to textiles (SILVACLEAN® system from Applied Silver, Hayward, CA), was installed in a Healthcare Laundry Accreditation Council (HLAC) accredited laundry serving three different hospitals. After a wash cycle, sheets and patient gowns were soaked for 2 minutes in a bath containing silver at a concentration of 1.7 to 1.8 mg Ag per litre of wash liquor (= 1.7 to 1.8 ppm) before the textiles were dewatered and dried. The textiles were loaded so that they contained 1.3 to 15 mg Ag per kg of textile (e.g. 8 to 10 mg Ag per kg). The textiles were analysed daily using inductively coupled plasma atomic emission spectrometry (ICP-AES) to ensure treatment within the target range.

Example 2 Reduction of microbial contamination of hospital textiles

Bed sheets and gowns were selected from other hospital textiles. Because these had easily identifiable surfaces facing the patient, they were sampled before and after patient use (so-called pre-patient and post-patient use, respectively). Samples for pre-patient use were randomly selected from clean linen storage trolleys in several hospital wards based on hospital layout and sample logistics. A set of gowns and sheets was selected each day using a random number generator to select ward, storage trolley, stack within the trolley and item within the stack. Samples were handled with clean nitrile gloves prior to patient use and placed in clean plastic bags for transport to the sample room.
Patient samples were collected after the patient was discharged, after the patient was transferred or after a routine change of bed linen and gown. Samples were taken immediately after discharge, before the beds were stripped and cleaned by the cleaning staff. The hospital instructed patients

to leave the gowns open on the bed so that both the fitted bottom sheet and the gown could be collected without direct handling of the item.

Two samples were collected from each textile item at predefined locations facing the patient. From the fitted lower sheets, samples were taken from the centre of the sheet, both top and bottom, approximately corresponding to a patient's back.

For gowns, one sample was taken from the mid-chest area and another from the centre of the suprapubic region. If the target sample area was visibly soiled, the sample was taken on the same sheet or gown but in a directly adjacent, non-soiled area.

Samples were collected using three types of culture media: Non-selective Tryptic Soy Agar (TSA) was used for total aerobic colony count and *S. aureus*-Selective Baird-Parker Agar was used for quantification of *S. aureus*. RSA-selective HARDYCHROM TM MRSA medium was also used. The plates had a surface area of 28.27 cm^2.

A total of 1 912 gowns and 2 074 bed sheets were analysed. 59% of the gown samples (1133 of /1912) and 51% of the bed sheet samples (1059 of 2074) were from pre-patient use. *Staphylococcus aureus*-specific cultures were detected on 9.5% of gowns (181/1912) and on 8.3% of sheets (173/2074). MRSA-specific cultures were detected on 10% of gowns (193/1912) and on 9% of sheets (187/2074).

Example 3 Aerobic bacterial colony isolation before and after silver infusion

Several bacteria were isolated from textiles used by patients. 8 times more aerobic bacterial colonies were isolated on non-selective media from post-patient clothing before silver application compared to clothing not yet used by patients (113.2 + 6.4 CFU/plate compared to 14 + 0.6 CFU/plate, p <0.0001). About 10 times more aerobic bacterial colonies were isolated from bed sheets after use compared to pre-treated bed sheets (54.8 + 3.2 CFU/plate compared to 5.2 + 0.5 CFU/plate).

The proportion of pre-treated gowns from which at least one aerobic bacterial colony was isolated (**see Tab.1**) decreased after silver treatment from 93% (432/466) to 72% (330/459) (Fisher's Exact Test, p <0.0001). In post-patient gowns, the proportion dropped from 98% (303/310) to 93% (281/303) after silver treatment (p = 0.0002). The proportion of sheets with at least one aerobic bacterial colony decreased from 89% (406/454) to 50% (230/457) after silver treatment (p <0.0001) in the pre-patient group and from 99% (406/409) to 94% (372/394) in the post-patient group (p <0.0001).

Textiles	Culture medium	Group	Number of isolated germs (%)	Number of non-isolated germs (%)	p-value*
Gowns, pre-use	all	Control	432 (93%)	34 (7%)	-
	aerobic germs	Silver	330 (72%)	129 (28%)	< 0.0001
	S. aureus	Control	28 (53%)	25 (47%)	-
		Silver	0 (0%)	45 (100%)	< 0.0001
	MRSA	Control	18 (29%)	45 (71%)	-
		Silver	1 (2%)	46 (98%)	0.0002
Gowns, after use	all	Control	303 (98%)	7 (2%)	-
	aerobic germs	Silver	281 (93%)	22 (7%)	0.003
	S. aureus	Control	29 (83%)	6 (17%)	-
		Silver	23 (48%)	25 (52%)	0.001
	MRSA	Control	9 (26%)	25 (74%)	-
		Silver	0 (0%)	49 (100%)	0.0001
Bedlinen, pre-use	all	Control	406 (89%)	48 (11%)	-
	aerobic germs	Silver	230 (50%)	227 (50%)	< 0.0001
	S. aureus	Control	5 (23%)	17 (77%)	-
		Silver	0 (0%)	46 (100%)	0.002
	MRSA	Control	2 (6%)	31 (94%)	-
		Silver	0 (0%)	47 (100%)	0.16
Bedlinen, after use	all	Control	406 (99%)	3 (1%)	-
	aerobic germs	Silver	372 (94%)	22 (6%)	< 0.0001
	S. aureus	Control	38 (84%)	7 (16%)	-
		Silver	32 (53%)	28 (47%)	0.0008
	MRSA	Control	9 (21%)	34 (79%)	-
		Silver	7 (11%)	57 (89%)	0.17

*Fisher's Exact Test, Significance < 0,05

Tab. 1 Proportion of textiles with bacterial isolates before (control) and after silver treatment.

Reference

„Systems and processes for treating textiles with an antimicrobial agent"

Patent-Nr.:
WO 2018/081774
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Anmelder:
Applied Silver, Inc. Hayward, CA, USA

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Curl Revival Gently Clarifying Co-Wash Formulation #03-NG-97

CLARIANT

Damage is undone with this smoothing and detangling conditioning cleanser. Leave hair sleek, soft and never weighed down.

Phase	Ingredients	INCI	Quantity (w/w)
A	WATER		69.45%
	GLYCERIN		3.00%
	DISODIUM EDTA		0.05%
	HYDROXYETHYLCELLULOSE		1.00%
	GLUCOTAIN® CARE	Cocoyl Methyl Glucoside	0.50%
	GENADVANCE® REPAIR	Quaternium-98	2.00%
B	**GENAMIN® BTMS**	Behentrimonium Methosulfate	4.00%
	CETEARYL ALCOHOL		6.00%
	PLANTASENS® OLIVE LD	Hydrogenated Ethylhexyl Olivate (and) Hydrogenated Olive Oil Unsaponifiables	10.00%
	NIPAGUARD® SCE	Sorbitan Caprylate, Propanediol, Benzoic Acid	1.00%
C	**EQUISCALP™**	Malus Domestica Fruit Cell Culture Extract, Hydroxyacetophenone, Ethylhexylglycerin	2.00%
	GREEN TEA MINT AROMATIC EXTRACT		0.50%
	LIME MINT AROMATIC EXTRACT		0.50%
	SODIUM HYDROXIDE/CITRIC ACID		q.s. pH to 5.5

Procedure:
1. Add phase A1-3 to main beaker and mix until uniform/particle free.
2. Slowly add A4, hydroxyethylcellulose, and mix until uniform.
3. Add GlucoTain® Care and Genadvance® Repair and heat phase A to ~85-90 °C.
4. Combine phase B and heat to ~85-90 °C.
5. Once both phase A and B are at 85-90 °C, start to homogenize and add phase B to phase A. Continue to homogenize for 4 minutes.
6. Cool batch to 50 °C, and add phase C ingredients, continue to homogenize 1 minute.
7. Adjust pH to 5.5.

Properties:
Viscosity: 23.3 kcPs @ 23.3% T-C @ 20 RPM
Appearance: White
pH: 5.50
Stability: 50, 40, RT, and 5 C for 12 weeks

Double Shift Ampoules Root Treatment Formulation #03-SM-05

CLARIANT

Let these treatments work overtime for you. Follow the scalp ampoule with this root refresher for the full treatment.

Phase	Ingredients	INCI	QUANTITY (w/w)
A	**PLANTASENS® CAREFEEL LIGHT**	Ethylhexyl Oleate	40.00%
	PLANTASENS® ARGAN OIL		5.00%
	PLANTASENS® OLIVE SQUALANE	Squalane	20.00%
	PLANTASENS® OLIVE LD	Hydrogenated Ethylhexyl Olivate; Hydrogenated Olive Oil Unsaponifiables	24.50%
	K-OLEO	Camellia Japonica Flower Extract; Camellia Japonica Seed Extract; Camellia Japonica Seed Oil; Camellia Sinensis Seed Oil; Ricinus Communis Seed Oil	24.50%
	DONGBAEK OIL	Camellia Japonica Seed Oil	5.00%
	LAVENDER ESSENTIAL OIL		3.00%
	NIPAGUARD® SCP	Phenoxyethanol; Sorbitan Caprylate	1.00%
	VITAMIN E	Tocopheryl Acetate	0.50%

Procedure:
1. Combine phase A ingredients and mix until uniform.

Properties:
Viscosity: N/A
Appearance: Yellow / clear oil
pH: N/A
Stability: 50, 40, RT, 5C for 12 weeks

Hair Care Mango Power Bi-K8-19 95.98% NATURAL ORIGIN

Biesterfeld
Competence in Solutions

solid hair mask · waterfree concept · easy combing · healthy shine · hair strengthening · fly-away control · soft hair · rinse-off

Phase	Ingredient	INCI	Supplier	% ww
A	**DANOX® HC-30**	Behenamidopropyl Dimethylamine, Dipalmitoyl-ethyl Hydroxyethylmonium, Methosulfate, Cetyl Alcohol, Stearyl Alcohol, Lactic Acid	Kao	67.00
	KALCOL® 6098	Cetyl Alcohol	Kao	13.30
	SOFTISAN® conditionHAIR	PCA Glyceryl Oleate	IOI Oleo	2.00
	SOFTISAN® GC8	Glyceryl Caprylate	IOI Oleo	0.50
	Lactabase® C14	Myristyl Lactate	Prod'Hyg	3.00
	Beurre Mangue (Mango Butter)	Mangifera Indica Seed Butter	Prod'Hyg	10.00
B	**GENENCARE® OSMS CC**	Betaine	DuPont Industrial Bioscience	3.00
C	**Arom. Mango Extract Blend N36009**	Available on request	Carrubba	1.20
				100.00

PRODUCT FEATURES
Appearance: Off-white solid bar
Stability: Stable for more than 3 months at 4°C and 20°C; stable for 3 weeks at 40°C.

MANUFACTURING PROCEDURE
1. Melt ingredients of phase A at approx. 75°C until a clear and homogenous solution is obtained.
2. Add phase B and homogenize (e.g. Ultra Turrax; in a mixer homogenize without recirculation!). Keep temperature at 70°C.
3. Add part C to batch shortly before pouring into the silicone mould and stir until completely homogenized.
4. Pour into silicone mould at approx. 65-70°C.

APPLICATION ADVICE
1. Apply generously on cleansed hair and leave on for 3-5 minutes.
2. Rinse-off thoroughly with warm water.

Keep the bar dry after use. Store at room temperature. Keep away from heat.

DISCLAIMER: Security advice: Cosmetic sample formulations are provided herein for illustrative purposes only. Such formulations are not for commercial formulations and have not been subject to comprehensive testing.

SOFW eVENTS

Mark your calendar

April 15, 2021

SpringTIME to innovate

Latest product developments in the Personal Care and Fragrance industry

Active ingredients

Multifunctional products

Natural/organic/renewable ingredients

June 17, 2021

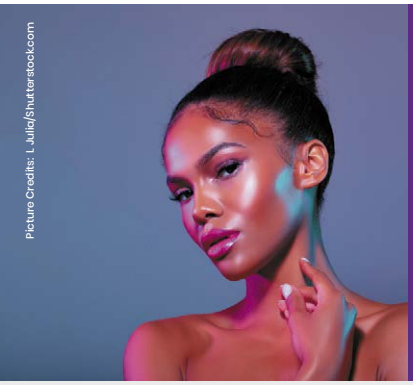
Here comes the SUN – TakeCARE

SPF, Blue light filter

Self-Tanner

Sun protection products

Testing and regulations



November 11, 2021

SkinNEWvation

Microbiome friendly & probiotic cosmetics

Facial care

Skin cleansing, soaps & hand disinfection

Moisturising care

Skin analysis

November 25, 2021

Rapunzel, don't let your HAIR down!

Shampoos & conditioners, Beard care

Hair styling & colourations, Hair pigmentation

Heat protection

Anti-dandruff, Anti-grease, Anti-greying

ZSCHIMMER & SCHWARZ

Solid Cosmetics are Here to Stay
Zschimmer & Schwarz Sets New Standards with Its Multifunctional Syndet Bases

Interview with Stefano Ferrigato, Global Director Personal Care Division, Zschimmer & Schwarz

Solids bars have become a staple in the bathrooms of environmentally conscious users. What makes this trend so special?
The use of solid cosmetics has recently gained popularity in the Beauty & Personal Care industry – in line with trends such as "waterless", "zero waste" and "clean beauty". Solid cosmetics, traditionally in the form of body and facial cleansers, represent an environmentally conscious approach to beauty by minimising the use of water, plastic and packaging. So, as a logical progression, this trend is now being applied to other products in the care and beauty industry.
The challenge, however, is to ensure that solid formulations, especially solid cleansing bars, give you the familiar pleasure of your regular product, especially in the case of hair care products like shampoos and conditioners. The demand for solid cosmetics is on the rise and new products with improved properties are constantly appearing on the market. At Zschimmer & Schwarz, we truly believe that this is a trend worth pursuing.

In your opinion, this trend is here to stay. How is Zschimmer & Schwarz adapting to this development, and which of your products cater to this trend?
Zschimmer & Schwarz offers various tailor-made syndet bases, the ZETESAP series, which are perfect for any requirement. All ZETESAP types have a balanced composition and are suitable for almost all applications in the rinse-off area: from shampoo bars to hand cleansing to shower products. There is a diverse mix of formulation options that can be combined with many different additives and perfumes due to their balanced composition.
With our latest product, ZETESAP 915 CS, we focus heavily on sustainability. It is based entirely on renewable raw materials, meets the requirements of natural cosmetics and is COSMOS-certified. A mixture of sodium coco-sulfate and sodium cocoyl glutamate creates a rich, creamy foam that is gentle on the hair and scalp.


Stefano Ferrigato

By simply adding perfumes and conditioning agents, our ZETESAP bases can easily be used to create solid shampoo bars that offer excellent performance in terms of wet and dry combing and smoothness of the hair. Additionally, the adjustable pH of ZETESAP eliminates the need for an acidic rinse after shampooing.

What is the difference between traditional soap bars and syndets developed by Zschimmer & Schwarz?
Traditional shampoos contain a lot of water in addition to the cleansing surfactants, conditioners and other nourishing ingredients. With ZETESAP, unnecessary water transport can be reduced to a minimum and the pieces based on ZETESAP are an economical solution. This makes ZETESAP products more environmentally friendly compared to traditional shampoos.
The balanced composition of the surfactants helps to avoid skin irritation. Soaps are made by mixing alkali with fats in the saponification process. The word syndet is a blend of the terms "synthetic" and "detergent", a detergent being a surfactant. While the higher pH value of soaps has no harmful effect on healthy skin, it can be different for sensitive or damaged skin. In such cases, mild cleansing is important to avoid further irritation of the skin. Syndets are also better suited for cleansing sensitive skin and even baby skin because of their lower pH compared to conventional soaps.
This lower pH, from neutral to slightly acidic, offers another advantage in terms of fragrances. Some fragrances are not suitable for soaps as they are unstable in a high-pH environment. In products formulated with Zschimmer & Schwarz syndet bases, we found no change in odour even after several years.

What makes the syndets based on ZETESAP special?
Syndets based on ZETESAP are characterised particularly by their uniformly homogeneous appearance and smooth surface. They offer excellent

foam formation and foam volume even in hard water, and the use of additional chelating is not necessary. An important product aspect, the sensory experience, can be adapted to the formulation concept with the help of additives such as other surfactants, active ingredients, extracts or conditioners. Imagination is the limit when it comes to our ZETESAP product range. It enables our customers to offer their end consumers a beauty routine that is 100% responsible and thus not only good for their skin, but also for the planet.

The development of the ZETESAP line shows that sustainability is an important topic for Zschimmer & Schwarz: what are the company's main actions in the field of environmental protection and resource conservation?

At Zschimmer & Schwarz, modern security measures as well as internal and external monitoring ensure that our work processes protect the environment. We reduce emissions and clean our wastewater. Our products, including the ZETESAP line, are checked for their environmental compatibility at every stage – from production to further processing. As a member of Responsible Care, we strive for constant improvement in the areas of environmental protection, safety and health, regardless of legal requirements. With the RSPO certification, we also commit ourselves voluntarily to the use of sustainably grown palm oil. For us, protecting the environment is not a burden, but part of acting on our sense of responsibility.

www.zschimmer-schwarz.com

mibelle GROUP biochemistry

New Energy for Stressed Hair Follicles

Mibelle Biochemistry Launches SantEnergy™

Interview with Dr. Christina Pickel, Study Manager, Mibelle Biochemistry

You recently have launched SantEnergy ™ obtained from the aerial parts of the Yerba Santa plant.
Yes, SantEnergy™ is the newest addition to our product portfolio. As we had observed that hair and scalp care have become increasingly important, we sought to develop an active ingredient that protects the most vulnerable part of the hair, the hair follicles, from environmental and endogenous stresses. We believe that a healthy scalp and roots are the basis for healthy hair, and thus providing new energy to the hair follicles will support the growth of full and kempt hair in individuals suffering from stress-related hair loss.

The „Yerba Santa" plant or "Holy Weed" is rather known to be used for medicinal purposes like for respiratory illnesses. How come you claim hair benefits for it?
Besides being used to treat upper respiratory infections in traditional medicine, Yerba Santa was also described to have anti-inflammatory, anti-bacterial, antioxidant and neuro-protective benefits. As we were looking into plants which can reduce the oxidative stress in the hair follicles caused by endogenous and environmental factors, the high antioxidant capacity of Yerba Santa was very intriguing to us. We therefore further characterized the active in this new context.

What is the active ingredient in SantEnergy™?
The high content of polyphenolic compounds in Yerba Santa has already been described in the 1980s and the various molecules have been well characterized since. In particular the bitter-masking flavanones homoeriodictyol, eriodictyol and sterubin are highly potent antioxidants, which we found during the development process in the Yerba Santa extract that is the basis for SantEnergy™.

What claims do you make for your product?
SantEnergy™ has two modes of action that complement one another very well: on the one hand it has an energizing effect similar to that of caffeine, and on the other hand it is a strong antioxidant. Through these actions, it delays the premature aging of hair follicles and protects hair follicle cells from oxidative damage. As a result, it increases both hair growth and hair density, so that the hair will be invigorated and strong.

How did you substantiate these claims?
We have performed various *in vitro* and clinical studies to test the active's efficacy. In a first *in vitro* study, we could show that SantEnergy™ binds to the adenosine receptor, which is also the molecular target of caffeine and we therefore presumed an activity similar to that of caffeine. To confirm this putative caffeine-like activity, we assessed the effect on the model organism *C. elegans*. These nematodes react to caffeine with an increase in their movement, and we could show that SantEnergy™ has the same effect on them, thus it indeed has a caffeine-like energizing effect. The antioxidant activity of the Yerba Santa active was shown both in cells and on isolated hair follicles. There, it protected the hair follicle cells from UVB-induced damage by upregulating the protective factor Nrf2, and reducing oxidative DNA damage. It further prevented premature transition to the late catagen phase by maintaining proliferation and reducing cell apoptosis in the hair follicle. Together, these activities led to the positive outcome in the clinical study we performed with 56 volunteers suffering from hair loss. Compared to the placebo group, we observed a strong increase in the hair growth coefficient (anagen/telogen ratio) in the subjects who had applied a hair serum containing SantEnergy™. This was caused by a significant increase of the number of hairs in the anagen phase, and a decrease of hairs in the telogen phase. As a result, the overall hair density had increased, confirming that SantEnergy™ had improved the hair loss of the volunteers.

How important are innovations for you?
Innovation is a cornerstone of our philosophy. While we have developed several innovative technologies, such as PhytoCellTec™ or MossCellTec™, in the past years, and we have brought liposomal delivery systems to the field of cosmetics, we are also following the latest research in the fields of aging, skin and hair biology. This is also what inspired us to develop this novel active ingredient: in the past years, research on

ANNIVERSARY

Picture Credits: Sundry Photography/shutterstock.de

the scalp and hair follicles showed how UV irradiation and pollution leads to oxidative damage of the hair follicles, which affects the hair cycle and ultimately leads to hair loss. With this knowledge, we could now launch an innovative active ingredient that tackles a problem of modern society which was only very recently described.

No events, no conferences, no visiting of clients in Corona times. How do you keep in touch with the markets?

Already before the pandemic, we had a strong online presence on multiple channels, which helped a lot to adapt at the beginning of this crisis. Even more than before, we now use dedicated webinars for introducing new products and presenting new study results. And in addition to that, our great sales team and distributors all over the world organize countless online meetings to keep in touch with customers, hear about their needs and problems and get valuable feedback from the markets. Luckily, technology enables us to even see each other virtually, which is the closest we can get to face-to-face meeting these days.

www.mibellebiochemistry.com

Mibelle Biochemistry Celebrates 30 Years of Innovation in 2021

Inspired by Nature – Realized by Science

Buchs/Switzerland, March 16, 2021. It all started back in **1991** when Mibelle Biochemistry was founded as a business unit of Mibelle Group in Switzerland, by *Dr. Fred Zülli*. From there, in 1994, Mibelle Biochemistry entered the international cosmetic market with a new molecule: "Sodium Carboxymethyl Beta-Glucan." A small team working together with Fred Zülli and Franz Suter developed the product and established the plant for production. Today, almost twenty-seven years later, CM-Glucan and its immune-boosting properties continue to be of great interest, especially in the pandemic. With this innovative new molecule, Mibelle Biochemistry was able to build up its distribution network in 50 countries. However, the global breakthrough for Mibelle Biochemistry came in 2008 with the launch of its blockbuster ingredient PhytoCellTec™ Malus Domestica. Mibelle Biochemistry became the first company to offer plant stem cells to the cosmetic market. With the plant cell culture technology known as PhytoCellTec™ the large-scale cultivation of callus cells from rare or protected plants, such as the "Uttwiler Spätlauber" apple variety, was achieved. In fact, the PhytoCellTec™ technology was even recognized at The United Nations Conference on Sustainable Development (Rio+20) as an Eco breakthrough.

"Our unique ingredients are inspired by nature and realized by science. Our mission is innovating for your success," explains *Dr. Zülli*. "This is what makes Mibelle Biochemistry stand out, along with our customer-oriented service culture."

With the headquarters in Switzerland and operating offices in the US and France, Mibelle Biochemistry has strengthened its position in the global cosmetic industry over the last 30 years. Under the name "Food & Health", Mibelle Biochemistry established a second product portfolio with active ingredients for the food supplements market four years ago. Its small range of highly innovative ingredients is expected to grow very quickly in the coming years.

A journey of award-winning excellence and innovation

Mibelle Biochemistry can reflect on an impressive journey of winning a variety of prestigious industry awards. Some of the more recent awards include the in-cosmetics Innovation Zone Best Ingredient Bronze Award for Alpine Rose Active and a BSB Award for IceAwake™ in the Most Innovative Raw Material category. Another highlight for Mibelle Biochemistry came in 2020 when it received the Frost & Sullivan Award for Global Personal Care Active Ingredients Company of the Year. In 2018, Mibelle Biochemistry was presented with the in-cosmetics Innovation Zone Best Ingredient Gold Award for MossCellTec Nr. 1.

And exactly 10 years after launching the plant stem cell concept, Mibelle Biochemistry was the first company to introduce the sustainable production of moss cultures to the cosmetic industry.

This year, Mibelle Biochemistry celebrates an important anniversary and can look back on an exciting thirty-year journey in the cosmetic industry. We at Mibelle Biochemistry are very proud of the successful collaborations with our customers and distributors around the world during this time. And we are now very much looking forward to continuing this fascinating journey in which we can offer innovative actives based on the motto "Inspired by nature realized by science" to the fast-changing cosmetic industry.

www.mibellebiochemistry.com

Color Cosmetics: What Consumers are Talking About

Interview with Paola Pérez, Strategic Marketing Manager, Global B2C, Lubrizol Life Science Beauty

How did Lubrizol become interested in doing an in-depth color cosmetics study?
Makeup is one of the most dynamic categories in social media, with brands being talked about regularly through user-generated content. Therefore, a study applying artificial intelligence to social media conversations about color cosmetics was an invaluable way to gain a deeper understanding and insight into consumer pain points and beauty goals to develop new ingredients and formulations that meet their needs. The Lubrizol Life Science Beauty team is always looking for innovative skincare and cosmetic solutions that are relevant to our brand partners and help people live a more beautiful life.

What methodology was used to conduct the study?
Between May 2019 and May 2020, 20 million sources from across the internet, including social platforms, forums and reviews, were analyzed in partnership with market research firm 113 Industries for beauty conversations related to the face, eyes, lips and nails. Artificial Intelligence technology enabled the extractions of the most relevant conversations while removing advertising, influencer and bot-related content. A human team then reviewed the remaining content, extracting patterns and trends.

What general trends did the study uncover?
General trends related to product claims and benefits:

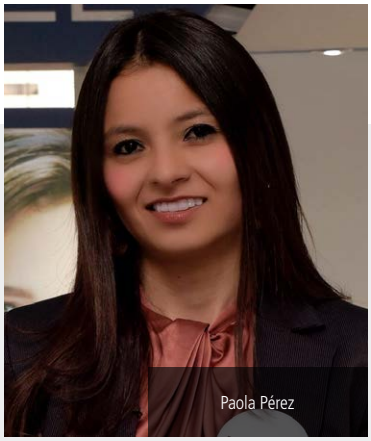
- There was a consistent spike of conversation related to product benefits and claims compared to conversation around shades, colors and makeup looks throughout most of 2020. Additionally, skincare was the top hashtag included in posts when consumers talked about makeup showing the connection between makeup routines and skincare.
- There are some new types of products that generated more conversation than traditional products. For example, foundations were not necessarily the most common topic related to the face and for lips, and lip gloss saw more conversation than other lip products.
- Makeup staples such as lipstick, blush and foundation dominated the conversation and are most often deemed "holy grail" products by consumers when they find desired performance and texture.

Were you able to categorize types of beauty consumers from their conversations?
Yes, our team uncovered four main types of beauty consumers that contribute to online conversations:

- The Personal Brand Builder – is an individual whose online presence is dedicated to makeup with the intent of building their brand and/or business in the category. They are key thought leaders in the cosmetic space: they lead trends and set example behaviors.
- The Personal Hobbyist – gets joy from their relationship with makeup and wants to continue to expand their knowledge. The willingness to expand their knowledge and collection of cosmetics makes them highly receptive to social influence and new trends.
- The Simple Everyday User – has a simple routine for everyday use that is efficient and serves its intended purpose. They are seeking a reliable product they feel confident will live up to its claims – likely to be set in their habits and not open to change.
- The Inexperienced Buyer – has limited knowledge, but has a desire to improve upon what they already know. They are seeking guidance and are very willing to learn; their behaviors and decisions are often based on advice from others.

Regardless of their type, are beauty consumers generally pleased with their cosmetic purchases?
While consumers are looking for "holy grail" products to add to their routines, the team has been able to identify a number of areas where consumers would like to see improvement such as long wear or natural looking solutions. In the meantime:

- Consumers compensate by continuously buying new brands and products until pleased, increasing the number of steps in their makeup routine or by using products in their makeup routine. They sacrifice on one attribute to satisfy another, and they subscribe to beauty boxes or travel sizes to sample before buying full sized. However, it's important for formulators to keep in mind that once they find a "holy grail" product, they are loyal to it.
- Consumers struggle to find makeup solutions that stay in place, especially mascara, lipstick and foundation. As a result, they compensate by using other products to stop the


Paola Pérez

spread, like powder on the undereye, concealer on the eyelid to prime before eyeshadow, and setting spray to avoid transfer onto other surfaces.

- Consumers struggle to find products that mimic true facial features (foundation that is not cakey, heavy, clumpy; eyeshadow/blush/lipstick that is not excessively bold or dark), so they compensate by using products in unintended ways to achieve a less dramatic look. For example, using brow pencil as eyeliner or brow gel as mascara.

How does this translate to product development?
Artificial Intelligence has given us a window into consumer thoughts and behavior that previously wasn't available. This gives brands the opportunity to develop products that truly resonate with consumers and solve for the things they don't like in existing face, eye, lip and nail products. The guesswork is taken out of the equation, increasing the likelihood that consumers will try a new product, fall in love with it and add it to their "holy grail" list of cosmetic staples.

For those wanting to learn more about study results, how can they learn more?
Companies can reach out to our team at www.lubrizol.com/beauty to learn more about the study and how its insights can benefit their brands and product formulation.

www.lubrizol.com/Personal-Care

PRODUCT LAUNCH

Givaudan

Givaudan Active Beauty Unveils Chronoglow™: When A.I. and Biomimetic Epigenetics Make Skin Radiance Go 3D

Argenteuil/France, March 17, 2021. Givaudan Active Beauty presents Chronoglow™, an active ingredient crafted by green fractionation and empowered by Artificial Intelligence (AI) able to mimic botanical epigenetic mechanisms for skin care benefits. Created from also known as the resurrection plant, Chronoglow™ is a natural cure for the skin, able to reverse the effects of ageing and improve its radiance.

One of the top consumers' expectations

Skin ageing is a major priority for consumers, always looking for smooth bright skin. According to our CMI study[1], 80% of consumers globally are upset to look older than their actual age, which can also impact their personal life and well-being. It's a fact that a radiant complexion is associated with living a healthy and balanced lifestyle. This is why the consumers' desire to reveal the natural luminosity and maintain the firmness of their skin by using sustainable and botanical solutions is important.
Mathias Fleury, Category Manager Active Beauty said: "Is an ice-age plant that has survived extreme climate conditions thanks to its unique epigenetic mechanisms of cellular survival. We are now able to mimic and reproduce what the plant does in its own cells in the skin. **Chronoglow™** is therefore a 100% natural & sustainable powerful botanical ingredient, with exclusive benefits of well-ageing and radiance."

The 3D of skin radiance

Chronoglow™ positively regulates the skin genetic information without modifying it. It rejuvenates the skin at different cellular levels (from epigenetics to proteins expression), and protects skin cells from senescence and oxidation. **Chronoglow™** reverses skin ageing to take back youth, but also enhances skin firmness and provides 3 dimensions of glow:

- Elasticity, already after 2 weeks of use, by up to +8.9%, more than 3 times better than the placebo. This positive impact on the skin elasticity is increasing during the whole duration of the clinical test, with an increase up to +15.3% after 2 months.
- Luminosity, by up to +3.8% after 4 weeks and up to +6.4% after 2 months, significantly better than the placebo, by a factor 1.9.
- Radiance, after only 2 weeks of use by up to +6.1%, more than 4 times better than the placebo and up to +12.5% after 2 months.

Always at the forefront of the highest level of technology, our researchers have used the power of Artificial Intelligence to better represent the clinical results and demonstrate the visual benefits of **Chronoglow™**. They have generated a beauty avatar that represents the significant results of the 3 dimensions of glow on the face.
To inspire the beauty industry, our formulation experts crafted Eau de Radiance, a glowing veil to regenerate the skin powered by **Chronoglow™**. Only a few drops of this liquid care over the face will rejuvenate and illuminate your skin tone. Also powered by Ocâline™ XP and Sophogreen™ plus, Eau de Radiance will soothe the skin, and offer a second skin protection thanks to Sens'Hyal® powder.

[1] Givaudan Active Beauty CMI Global Study Results, March 2019

www.givaudan.com

Lubrizol

Lubrizol Innovates Hair Care with **Kelco-Care™** Diutan Gum

Sustainable, nature-derived efficient rheology modifier for conditioners, treatments and hair color

Cleveland/USA, March 9, 2021. Lubrizol Life Science – Beauty (LLS Beauty) brings new hair care solutions to consumers with **Kelco-Care™** diutan gum, a sustainable, nature-derived efficient rheology modifier ideal for conditioners, treatments and hair color.

According to a 2020 Euromonitor beauty survey, damage is one of the top global consumer hair concerns including breakage, split ends, brittleness, and tangled hair.

"**Kelco-Care™** diutan gum addresses each of these concerns as women are looking for innovative hair care products that help them achieve beautiful, healthy hair," said *Juliana Mancini Gomiero*, Global Hair Care Marketing Manager, LLS Beauty.

Kelco-Care™ diutan gum is a naturally derived, readily biodegradable, efficient rheology modifier with thickening and suspending capabilities that can impart protection and repair benefits to hair fibers even at low use levels and boosted with added salt. It also has film forming capabilities with excellent conditioning benefits that give a nice, silky sensory experience to the hair with no drag or stickiness.

Suitable for conditioners, treatments and hair color, **Kelco-Care™** diutan gum works in a wide range of pH and temperatures. In addition, in formulations it is easy to disperse and cold processable. It is also high efficiency due to high pseudoplasticity with greater low shear rate viscosity (and yield).

Kelco-Care™ diutan gum is efficient by nature, helping brands to develop high powdered products using **Kelco-Care™** diutan gum at low use level concentrations that are very sustainable.

LLS Beauty ready-to-market formulations featuring **Kelco-Care™** diutan gum include: Protect and Restore Bio-based Conditioner, Ultra-Hydration Nourishing Conditioner, Soothing Natural Scalp Milk, and Naturange Green Tea Black 2.0 permanent hair color.

To learn more about **Kelco-Care™** diutan gum, visit Lubrizol.com/beauty

Kelco-Care™ diutan gum products are manufactured by CP Kelco® U.S., Inc. Kelco-Care is a trademark of CP Kelco® and is used under license. Lubrizol has a global agreement with CP Kelco® to bring **Kelco-Care™** diutan gum to the beauty markets.

www.lubrizol.com

CORUM
Advance through Knowledge

Corum Launches a New Green Product – **AZECLAIR™ P**

Taipei/Taiwan, February 11, 2021. With global GHG emissions reaching a record level and have caused serious climate change, environmental protection is a matter of social responsibility which admits of no delay. As a socially responsible manufacturer of cosmetic ingredients, Corum integrates ESG into its business operations and takes urgent actions to combat climate change and its environmental impact by aligning with the goal 13 in UN SDGs- climate action.

At the beginning of year 2021, Corum is delighted to launch a greener version of our active ingredient in March. **Azeclair™ P** (INCI: Potassium Azeloyl Diglycinate) is ameliorated from its original liquid counterpart through the removal of water to become 70% lighter in weight with the aim to reduce carbon footprint in the transportation and production of finished cosmetics. The weight in transportation is further 33% off, which in sum enables to largely reduce 11-15% of the CO_2 emission than before.

Azeclair™ P is catered for oily and acne-prone skin with high efficacy in sebum normalizing, skin brightening, moisturizing and anti-pollution. It is gentle and non-irritating to skin and mucosa. It is particularly suitable in skin care products to prevent masknes; it is highly recommended in clear solutions for pore cleansing and dull skin treatment. **Azeclair™ P** comes in powder form with much higher purity and is free of preservatives. It is highly water soluble and compatible with various cosmetic ingredients.

Corum aims to continuously improve our product lines through operational excellence and innovation to lessen its environmental impacts and amplify its contributions toward a more sustainable society with our people, upstream and downstream partners to reduce CO_2 emissions, value natural resources, minimize wastes and follow the principles of green chemistry.

www.corum.com.tw

PRODUCT LAUNCH

SILAB: GLYCO-REPAIR®

Mediator of the Natural Skin Repair Process

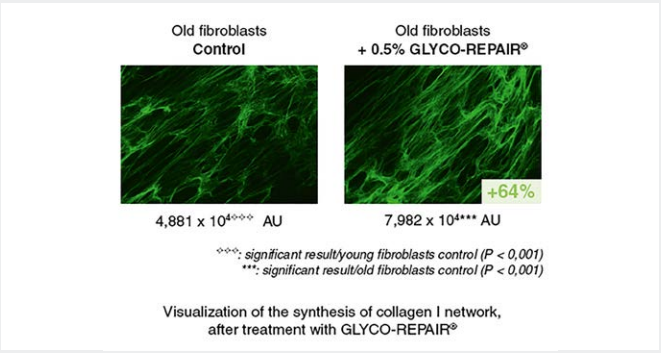
Saint-Viance/France, February 3, 2021. A repairing active ingredient obtained from locust beans, **GLYCO-REPAIR®** regenerates the endogenous processes of skin repair with a double action on the epidermis and dermis for a pro-regenerating, anti-wrinkle and smoothing effect.

REPAIRING ACTIONS ON THE DERMIS AND THE EPIDERMIS

Repair the signs of aging

Due to environmental factors and aging, the skin loses its capacity to regenerate, thereby weakening the cutaneous barrier and the dermal architecture.
Faced with this observation, SILAB developed as soon as 2008 **GLYCO-REPAIR®**, a natural active ingredient able to reactivate the natural processes of skin repair.
In 2020, SILAB brings additional efficacy data to its active ingredient in a context of aging:

- At the level of the epidermis, by confirming the capacity of **GLYCO-REPAIR®** to reactivate the different biological pathways involved in re-epithelialization, in particular keratinocyte differentiation, and by highlighting its healing action [1];
- At the level of the dermis, by reaffirming the ability of **GLYCO-REPAIR®** to restore the integrity of the support tissue, especially with its action on the architecture of the dermal matrix and on the functionality of fibroblasts [2].



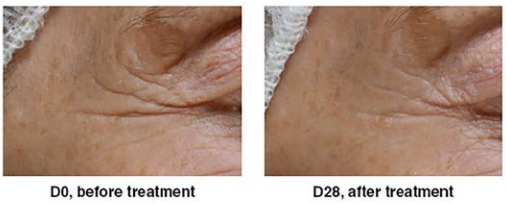
Visualization of the synthesis of collagen I network, after treatment with GLYCO-REPAIR®

[1] Tested at 0.5% on wounded reconstructed epidermis SILABSKIN® RE, **GLYCO-REPAIR®** improves the wound repair by +98%.
[2] Tested at 0.5% on human fibroblasts from young and old donors, **GLYCO-REPAIR®** increases the synthesis of collagen I network by +64%.

A COMPLETE REPAIRING CARE

Anti-aging and pro-regenerating

As of 2008, the ability of **GLYCO-REPAIR®** to repair skin tissue with rapidity and intensity after an aggression had been demonstrated. The new efficacy data highlights that the active ingredient also repairs age-related disorders. Indeed, a study by fringe projection demonstrated that **GLYCO-REPAIR®**, tested at 3% during 14 days of twice daily application on a mature Caucasian panel, improves skin microrelief and especially parameter Sa (-8.6%). In addition, after 28 days of twice daily application, a clinical scoring by trained evaluators using digital photos indicated that the appearance of pores is reduced (-13.8%) and the crow's feet wrinkles are decreased (-10.5%).
A self-evaluation by volunteers confirmed these data, since 83% of them perceive their skin grain refined and 94% report their skin to be smoother and their fine lines and wrinkles to be less visible.



Visualization of the crow's feet wrinkles, after treatment with GLYCO-REPAIR®

LOCUST BEANS WITH REGENERATING PROPERTIES

Traceable and controlled supply

In order to support its concept of tissue regeneration, SILAB has selected a natural raw material with repairing properties: the carob tree (*Ceratonia siliqua*). Its rustic nature and its capacity to adapt to environmental constraints make it appreciated to restore degraded ecosystems.
SILAB's attention has been focused on the locust bean gum and has formed two partnerships on the island of Majorca (one for harvesting locust beans, the other for processing them into gum), the aim being to ensure the traceability starting at the parcel of land and to control quality. A controlled enzymatic hydrolysis process enabled SILAB to extract oligogalactomannans with a unique mean degree of polymerization (DP = 17), responsible for the efficacy of the active ingredient.

GLYCO-REPAIR® is a patented solution of natural origin at 99.3% (ISO 16128) and respecting biodiversity regulations. Available in aqueous solution (recommended amount: 1 to 3%), it is compliant with international cosmetic regulations (Europe, United States, Japan, China, etc).

www.silab.fr

PRODUCT LAUNCH

Picture Credits: Tinnakorn jorruang/shutterstock.de

Gelest Launches Unique Hybrid Fluid Based on Cannabidiol (CBD)

MORRISVILLE/Pa., February 24, 2021. Gelest, Inc. introduces **Vertasil® TM-CBD1**, a novel CBD hybrid fluid that that will increase formulation opportunities for personal care.

"We specifically designed this patented molecule to extend solubility parameters and improve the compatibility of CBD with a wider range of materials without compromising CBD activity or benefits," said *Daria Long,* Gelest Vice President and General Manager, Personal Care. "The emollience of this modified CBD combined with the ability to form thin films enables distribution over skin and hair, providing effective treatments at extremely low concentrations."

"**Vertasil® TM-CBD1** – the trisiloxane functionalized cannabidiol isolate – can be easily incorporated into silicone gel matrices such as polydimethylsiloxane (PDMS) and other primarily silicone-based formulations," Long added. "In fact, **Vertasil® TM-CBD1** is the only ingredient that enables the delivery of Cannabidiol from PDMS gels." As an added benefit, it offers the potential for controlled release of CBD.

The newest product in Gelest's Vertasil® line of siloxane "tipped" natural products, **Vertasil® TM-CBD1** provides the lubricity and softness of a silicone oil without the greasiness of natural oils. Uniquely compatible with silicones in addition to natural oils, hydrocarbons, esters, glycols and silicone derivatives, **Vertasil® TM-CBD1** is targeted for use in silicone serums and oils; silicone, scar treatment and stretchmark patches; and face and eye treatment masks. The ability of this hybrid fluid to generate effect at low concentrations offers economic advantages compared to pure CBD.

www.gelest.com

Lipoid Kosmetik – New Substantiated Extract: **Water Lily Pro**

Steinhausen/Switzerland, March 30, 2021. Lipoid Kosmetik is a leading manufacturer of high-quality botanical extracts, actives and natural phospholipid products for the cosmetic and personal care industry. With a clear insight into our consumers' needs, Lipoid Kosmetik presents the new product **Water Lily Pro**.

Water Lily Pro – Perfect Volume for Urban Hair

Water lilies originate from the water and symbolize beauty, purity and resurrection. This association makes water lilies an ideal starting point to create water-based cosmetic concepts. **Water Lily Pro** is a natural, COSMOS-approved substantiated extract from water lily roots.

The underwater root systems of water lilies produce a unique set of phytochemicals. Cleansing saponins, anti-oxidative flavonoids, and keratin-enforcing tannins are an ideal combination, perfectly suited for the daily hair care routine. **Water Lily Pro** shows the following user benefits:

- Hair protection in an urban environment
- Improved hair manageability
- Taming of frizzy hair
- Optimized hair volume & definition

Water lily invokes positive associations. Together with its proven efficacy, **Water Lily Pro** is a powerful ingredient for hair care applications such as pollution protection, taming and volume optimization.

www.lipoid-kosmetik.com

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VINCENTZ

BASF presents roadmap to climate neutrality

- **Target of net zero CO_2 emissions globally by 2050[1]**
- **Significant 25 percent reduction in CO_2 emissions already by 2030**
- **Investments of up to EUR 4 billion planned by 2030**

Ludwigshafen/Germany, March 26, 2021. BASF is setting itself even more ambitious goals on its journey to climate neutrality and wants to achieve net zero emissions by 2050. Based on the most recent progress in developing low-emission and CO_2-free technologies, the company is also significantly raising its medium-term 2030 target for reductions in greenhouse gas emissions: BASF now wants to reduce its greenhouse gas emissions worldwide by 25 percent compared with 2018 – and to achieve this despite targeted growth and the construction of a large Verbund site in South China. Excluding the effects of the planned growth, this means cutting CO_2 emissions in half in the current business by the end of this decade. Overall, BASF plans to invest up to EUR 1 billion by 2025 to reach its new climate target and a further EUR 2 billion to EUR 3 billion by 2030.

In 2018, BASF Group's worldwide emissions amounted to 21.9 million metric tons of CO_2 equivalents. In 1990, this figure was roughly twice as high. The new 2030 emissions goal represents a reduction of approximately 60 percent compared to 1990 levels, which exceeds the European Union's target of minus 55 percent. "The new climate goals underscore our determination and BASF's commitment to the Paris Climate Agreement. Climate change is the greatest challenge of the 21st century. In response, we must adapt our processes and our product portfolio. We need to accelerate this transformation now. We must first concentrate on the initial steps of this journey, not the final ones. That is why BASF will increase its use of renewable energies. And we will accelerate the development and deployment of new CO_2-free processes for the production of chemicals. With transparency and offerings to systematically and incrementally reduce the carbon footprint of BASF products throughout the entire value chain, we help our customers in all industries to reduce the carbon footprint of their own products," said *Dr. Martin Brudermüller*, Chairman of the Board of Executive Directors of BASF SE.

BASF to replace fossil fuels with new technologies

At the heart of the long-term transition toward net zero CO_2 emissions by 2050 is the use of new technologies, which will replace fossil fuels such as natural gas with electricity from renewable sources. Most of these technologies are being pioneered by BASF in collaboration with partners and are currently in a pilot stage. Broad scaleup of these technologies will only be fully realizable after 2030. In order to accelerate the avoidance of CO_2 emissions prior to that date, BASF also continues to systematically implement continuous improvement processes for existing production plants. In addition, BASF will progressively switch to renewable sources to meet its electricity needs and intends to invest in wind parks to facilitate this.

One of the most important new technologies that BASF is currently developing are electrically heated steam crackers for the production of basic chemicals such as ethylene, propylene and butadiene. These chemicals are building blocks for numerous value chains and are essential for chemical production. Hydrogen is another important feedstock for many chemical production processes. To achieve CO_2-free production of hydrogen, BASF is pursuing two processes in parallel: the commercially available water electrolysis and methane pyrolysis, for which BASF has developed a new process technology. Another important lever to increase energy efficiency is the use of electrical heat pumps to produce CO_2-free steam from waste heat. BASF's goal is to work with Siemens Energy to gradually ramp up this technology to industrial scale and use it for waste heat recovery at entire sites.

BASF expects that this switch to climate-neutral production processes will lead to a sharp increase in electricity demand at the group's major sites, including the largest production site in Ludwigshafen, in the coming decade. From around 2035, the group's electricity demand is expected to be more than three times higher than it is today.

"This will require investments for the development and construction of new production plants. A precondition for the transformation of chemical production is the reliable availability of large quantities of renewable electricity at competitive prices. At the moment, that is not the case in Germany. BASF therefore aims to participate in investments in renewable energy generation facilities to meet its own demand. Regulatory framework conditions are also essential for making this transformation economically feasible," added *Brudermüller*.

BASF working on numerous flagship projects

In addition to the planned investments in renewable energies, BASF is pursuing a number of specific flagship projects:

- Together with SABIC and Linde, BASF is working on the realization of a pilot furnace for the world's first electrically heated steam cracker. Compared to conventional crackers, this would enable nearly CO_2-free production of basic chemicals. If the necessary funding is granted, start-up of the pilot plant is slated to begin as early as 2023.
- BASF is developing methane pyrolysis technology for the CO_2-free production of hydrogen from natural gas. Compared to other processes for emission-free hydrogen production, methane pyrolysis requires only around one-fifth

as much electrical energy. A pilot reactor has been constructed in Ludwigshafen and is being started up. Funding for this project was provided by the German Federal Ministry of Education and Research.

- In collaboration with Siemens Energy, BASF is currently investigating possibilities for the construction of a PEM (proton exchange membrane) water electrolysis system with a capacity of 50 MW for CO_2-free production of hydrogen from water and electricity at the Ludwigshafen site. This CO_2-free hydrogen would be primarily used as a raw material in the Verbund but would also be used to a limited extent to support the launch of the mobility market in the Rhine-Neckar metropolitan region.
- At the Antwerp site, BASF is planning to invest in one of the largest carbon capture and storage (CCS) projects under the North Sea. Together with partners in the Antwerp@C consortium, this creates the opportunity to avoid more than 1 million metric tons of CO_2 emissions per year from the production of basic chemicals. A final investment decision is targeted for 2022.

Competitiveness must be maintained

BASF has set itself an ambitious goal of climate neutrality by 2050 because the company is convinced of the long-term strategic necessity as well as the technical feasibility. However, most of the new technologies are not yet competitive under today's framework conditions. Since it is very capital-intensive to replace existing highly efficient production processes with new plants, BASF is trying to secure funding from European and national programs such as IPCEI (Important Projects of Common European Interest).

"We are convinced that ultimately all players involved will work together to make this once-in-a-century transformation economically successful. This also includes consumers accepting higher prices for CO_2-free products throughout the value chain to offset higher operating costs and additional investments. To achieve this, we need new cooperation between industry and policymakers that leads to positive, outcome-oriented regulations and preserves our international competitiveness," said *Brudermüller.*

[1] Based on Scope 1 and Scope 2 emissions of the BASF Group; other greenhouse gases are converted into CO_2 equivalents according to the Greenhouse Gas Protocol.

www.basf.com

Fraunhofer IVV

Cocoa butter from fruits with optical defects for use in the cosmetics industry

Fraunhofer IVV plans project with Brazil

Freising/Germany, March 10, 2021. The Fraunhofer Institute for Process Engineering and Packaging IVV is planning a CORNET project with UNICAMP (Universidade Estadual de Campinas) in Brazil to identify new applications for cocoa butter from damaged cocoa fruits.

Cocoa fruits with optical defects are currently either discarded, contaminating the environment, or mixed with perfect fruits in growing regions, reducing the quality grade of the crop, and resulting in lost profits for producers. The visual defects are caused by fungal diseases and result in crop losses of 30% of world production.

At the same time, the raw material price for cocoa butter has been rising steadily in recent years. In order to meet the high demand and reduce prices, the existing scarce resources in the growing regions must be optimally utilized.

Since the optically damaged cocoa beans can nevertheless be processed into flawless cocoa butter, which is, however, not used in the food sector, new areas of application are required.

The goal of this project is to identify new applications for cocoa beans derived from fruit that have the fungal diseases black pod disease (Phytophtora palmivora) and witches' broom (Moniliophthora perniciosa).

Cocoa butter has a wide range of applications in cosmetics – from color cosmetics and leave-on to rinse-off and hair care products. The project will investigate whether cocoa butter from cocoa fruit with optical defects can also be used in the cosmetics industry.

With the results of the project, cocoa butter can be offered on the world market in larger quantities and at significantly lower prices. Harvest losses can be reduced and resources in the growing areas can be used more efficiently, improving living and environmental conditions for producers. The project is funded by CORNET and is currently in the application phase.

CORNET stands for Collective Research Networking and facilitates transnational collaborative research projects. The initiative networks national and regional collaborative research programs from different countries to enable international research projects for the benefit of small and medium-sized enterprises. In Germany, CORNET is based on the Industrial Cooperative Research (IGF) funded by the Federal Ministry for Economic Affairs and Energy (BMWi).

We are searching for participants for the project-accompanying consortium.

If you are interested in participating, free of charge, your contact persons are: Isabell Rothkopf **isabell.rothkopf@ivv.fraunhofer.de** and Arielle Springer **arielle.springer@ivv.fraunhofer.de**

Givaudan

Givaudan joins WBCSD and 40 member companies to launch **Vision 2050: Time to Transform**

Genf/Switzerland, March 25, 2021. Givaudan has joined the World Business Council for Sustainable Development (WBCSD) and more than 40 of its members including Unilever, Nestlé and Natura, to launch "Vision 2050: Time to Transform".

In response to the three critical global challenges of the climate emergency, nature loss and mounting inequality, Vision 2050: Time to Transform puts forward a shared vision of a world in which more than nine billion people are able to live well, within planetary boundaries, by 2050.

To achieve this, it calls for transformation at scale, with business focusing its actions on where it can most effectively lead the system transformations needed. It calls for collaboration at unprecedented levels to deliver impact fast and for business leaders to adopt three mindset shifts: reinventing capitalism that rewards true value creation; focusing on building long-term resilience; and taking a regenerative approach beyond doing no harm.

Gilles Andrier, CEO Givaudan comments: "The long-term success of business depends on thriving societies to trade with, and a healthy planet for us all to exist on. Vision 2050: Time to Transform provides ambitious guidance to the business community on how to accelerate change in the decade ahead. It presents an opportunity to unlock the incredible potential of a green economy, as businesses grow with their customers and act as a force for good. We're proud to help drive forward this inspirational agenda as the business community comes together to transform."

At the heart of Vision 2050: Time to Transform, are nine transformation pathways, aligned with the Sustainable Development Goals and the targets of the Paris agreement. These are actionable routes for companies to take across industries to ensure a more sustainable and prosperous future. These cover the areas of business activity that are essential to society: energy; transportation and mobility; living spaces; products and materials; financial product and services; connectivity; health and wellbeing; water and sanitation; and food.

WBCSD President and CEO Peter Bakker comments: "Vision 2050: Time to Transform should not be read with the idea that tomorrow is going to be much the same as today. This is a report for change, starting now, outlining how business needs to play a leading role. We have no time to waste. Achieving this vision requires a wholesale transformation of everything we have grown up with: energy needs to decarbonise; materials need to go circular; food needs to be produced sustainably and equitably and provide healthy diets."

"Our future depends on transformation. One of the keys to success will be a mindset shift around capitalism. Our economic systems, incentives, global accounting standards and capital market valuations can no longer just be based on the financial performance of businesses: we must integrate our impact on people and planet as part of how we define success and determine enterprise value."

www.givaudan.com

symrise

Symrise & Van Aroma launch **'Nilampedia'**

A learning platform for patchouli farmers in Indonesia

Holzminden/Germany, March 11, 2021. Symrise and its partner Van Aroma, the largest supplier of patchouli oil worldwide, have launched the Nilampedia platform for farmers in Indonesia on YouTube and Facebook. The platform aims to provide knowledge and share experience on sustainable patchouli cultivation to secure the supply of high quality patchouli oil, and improve the living conditions for farmers and their families. The partners have been running a Bridging The Gap project as part of the wider commitment to sustainable sourcing and growing Patchouli in Indonesia for the past few years. In this context, they have collaborated with Sunflag Agrotech for Agronomy support in this program.

Consumers are becoming more environmentally aware. They are increasingly looking for sustainable products from responsible companies who adopt best practices. Symrise is responding to this shift in consumer demand with Nilampedia, among others. The platform follows a clear sustainable approach – good agricultural practices, long term plans, education and collaboration – to improve the life quality of farmers and their families, linked with the commitment to produce high quality products. Nilampedia acts as a game changer when it comes to educating farmers with the information they need. Benefits of this platform include providing interactive opportunities between the Nilampedia team and the farming community to discuss agronomical challenges such as flooding or plant diseases in real-time.

Farmers can access Nilampedia on three channels:
1. YouTube Channel: Nilampedia
2. Facebook Page: Nilampedia
3. Facebook Community: Komunitas Nilampedia

"We would like to invite all farmers and their communities to join Nilampedia. We will discuss how to manage soil, seedlings and planting. We will also to talk about irrigation and explain matters relating to harvesting and post-harvest care. We sincerely hope that all patchouli farmers benefit from the information", said *Ramkumar Venkataraman*, Symrise's Vice President of Global Sustainable Sourcing, Scent and Care Division.

"Sharing is caring, and we believe Nilampedia will help bridge the gap between farmers and experts who can advise on the situations farmers face and help solve critical challenges in patchouli cultivation. We believe that educated farmers make better decisions for a sustainable planet. Over the last five years, we have driven this agenda and the patchouli industry today is in a much better position", added *Sandeep Tekriwa*l, CEO of Van Aroma.

www.symrise.com

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