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# Minimal Care - Spa-Feeling for Skin and Hair

E. Besic Gyenge, S. Hettwer, B. Obermayer

## abstract

Skin minimalism or minimal skin care is a new trend that is taking hold in the cosmetics world. On the one hand, it is about formulating as few different ingredients as possible into cosmetic products, and on the other hand, it is about creating maximum beauty effects with only one active ingredient, for example. Here we present two hydration products that can do just that. In Skin Care and also in Hair Care.

## Introduction

Skin hydration is one of the most important parameters for attractive skin. Basically, it only takes this minimal effort for satisfying effects (Skinimalism). After a visit to the spa, our skin feels like newborn: plump, supple and healthy. On the one hand, this is due to a well-moisturised *stratum corneum*, and on the other hand, it is due to the activation of biological processes that keep the skin in good condition even after the spa visit. Substances that strengthen the skin barrier and bind moisture themselves are mainly responsible for an immediate effect. A basic cosmetic formulation already provides the basic prerequisite by containing lipids and water as an emulsion. Lipids strengthen the water-impermeable lamellar lipid layer of the skin barrier and prevent further dehydration [1]. Water binds to keratin and to the skin's natural moisturisation factor (NMF) and can be retained in the stratum corneum for a certain time [2]. However, this effect only lasts for a relatively short time until the original condition of the skin is reached again. To maintain a real spa feeling for several hours, active ingredients must be formulated into the cosmetic base. Typically, these are substances that strengthen the skin barrier and promote water retention. Here, natural substances that are already present in the skin barrier or are well integrated have proven to be beneficial. On the one hand, these can be lecithins, which integrate into the lamellar lipid layers of the skin barrier, and on the other hand amino acids, also natural components of the skin, namely as part of the NMF. Since NMF originates from the skin protein filaggrin through proteolysis [1], supplementing NMF with natural amino acids seems to be a logical addition for increasing the water retention capacity of the skin. In addition to these "acute" measures to promote skin hydration, the skin can be encouraged via biological activation to generate a greater amount of moisture-retaining substances itself. Here, so-called adaptogenic - stress-relieving and restorative - substances can help to promote the cell biology of stressed skin. The result is an increased production of lipids for the skin barrier and filaggrin for the provision of NMF. The

skin is moisturised from the inside, so to speak. In addition to these medium - to long-term cosmetic aids, there are a number of superficially acting substances. Mostly polymers with a high water-binding capacity. These include, for example, the well-known hyaluronic acid, but also other sugar polymers such as lichenans from the lichen *Cetraria Islandica* (Icelandic moss), which are so effective that they are even used to moisten the mucous membrane of the throat.

But it's not just relaxed, moisturised skin that leaves us feeling satisfied and happy after a visit to the spa. Our hair makes up a large part of our appearance and this also needs the right level of moisture. Too little water in the hair makes it look dull, straw-like, brittle and lacking in strength. Too much, on the other hand, can turn a super-smooth look into a dishevelled tousled look in a matter of minutes. Our hair depends on the care we give it every day. An intact lipid (18-Methyleicosanoic acid / 18-MEA) and closed cuticle are essential to bind and retain water in the hair [3]. Hair is made of keratin and water molecules can penetrate through the hair layers and bind to the keratins with the help of the water bridges. By reorganising the hydrogen bonds, we can style our hair. But daily washing and styling damages our hair. The lipid layer is destroyed and the cuticle damaged. This favours the loss of water. This makes it all the more important to add the right care ingredients to shampoos, conditioners or hair masks. Three of the best-known moisturising ingredients in hair care are glycerine, lecithin and wheat proteins. Glycerine can bind moisture from the air and wheat proteins, or rather the amino acids, can strengthen the hair structure and smooth the hair shaft. Lecithins with the fatty acids also improve the texture of the hair and can effectively capture and lock in moisture. The hair is stronger, shinier and completes the spa feeling.

## Materials and Methods

The *in vivo* studies were conducted in accordance with the Declaration of Helsinki of the Worlds Medical Association.

All study participants signed a written informed consent form at the beginning of the study.

### In-vivo skin studies

Double-blind, placebo-controlled, intra-individual study with 20 female subjects with Caucasian skin, 36 - 45 years. A cosmetic formulation was applied twice daily to the inner side of one forearm (placebo; INCI: Aqua, Caprylic/Capric Triglyceride, Phenoxyethanol, Caprylyl Glycol, Sucrose Stearate, Carbomer, Sodium Hydroxide). The same formulation with 3% HYDRACTIN®-LMF (INCI: Propanediol, Aqua, *Polypodium Vulgare* Rhizome Extract, *Cetraria Islandica* Thallus Extract, *Sphagnum Magellanicum* Extract, Citric Acid) was applied to the other forearm as verum (randomised). Skin hydration was determined before application and after 14 and 28 with corneometry (Courage and Khazaka, MPA 5 CPU). Elasticity was measured using a cutometer (Courage and Khazake, MPA580), and roughness using fringe projection (Canfield, PRIMOS compact high-res).

Double-blind, placebo-controlled, intra-individual study with 6 female subjects with Caucasian skin, 44 - 65 years with very dry skin. A cosmetic gel base was applied to the leg twice daily (placebo; INCI: Aqua, Carbomer, Phenoxyethanol, Ethylhexylglycerin, Sodium Hydroxide). The same formulation with 2 or 4 % AQUARICH® (INCI: Glycerin, Aqua, *Avena Strigosa* Seed Extract, Lecithin, Potassium Sorbate, Citric Acid) was applied to the other leg as verum (randomised). The skin was imaged with a Hirox® video microscope before application, after 7 and 14 days.

### Ex-vivo hair studies

**All experiments were performed on brown bleached Caucasian hair strands.**

For surface visualisation with electron microscope, the hair braids were treated with the shampoo (INCI: Water, Sodium Laureth Sulfate, Cocamidopropyl Betaine, Sodium Chloride, Citric Acid, Levulinic Acid, Sodium Levulinate, Glycerin, p-Anisic Acid) containing 0. 2% AQUARICH® (INCI: Glycerin, Water, *Avena Strigosa* Seed Extract, Lecithin, Potassium Sorbate, Citric Acid) washed 5 times and dried. Untreated but damaged hair was used for comparison.

The gloss of the hair braids was measured with the Courage+Khazaka Glossymeter. The hair was washed with 0.5% AQUARICH® shampoo (Water, Sodium Laureth Sulfate, Cocamidopropyl Betaine, Sodium Chloride, Sodium Benzoate, Potassium Sorbate, Glycerin, *Avena Strigosa* Seed Extract, Lecithin) in several cycles (1, 3 and 5 times) and dried. One hair strand was washed with the shampoo without AQUARICH® and served as an initial value for comparison.

Tensile strength studies were made with the Z100 Proline table-top testing machine with force transducer XForce type P



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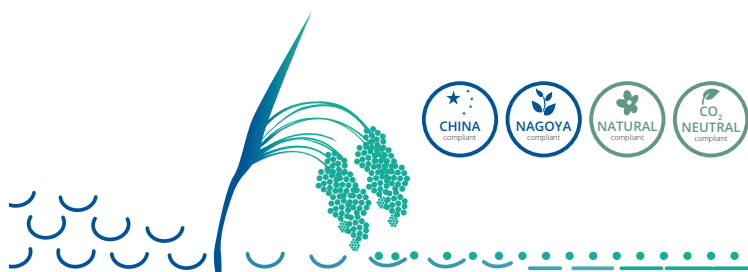
Rebuilds the damaged skin barrier



Strengthens the healthy skin microbiota



Helps with atopic dermatitis



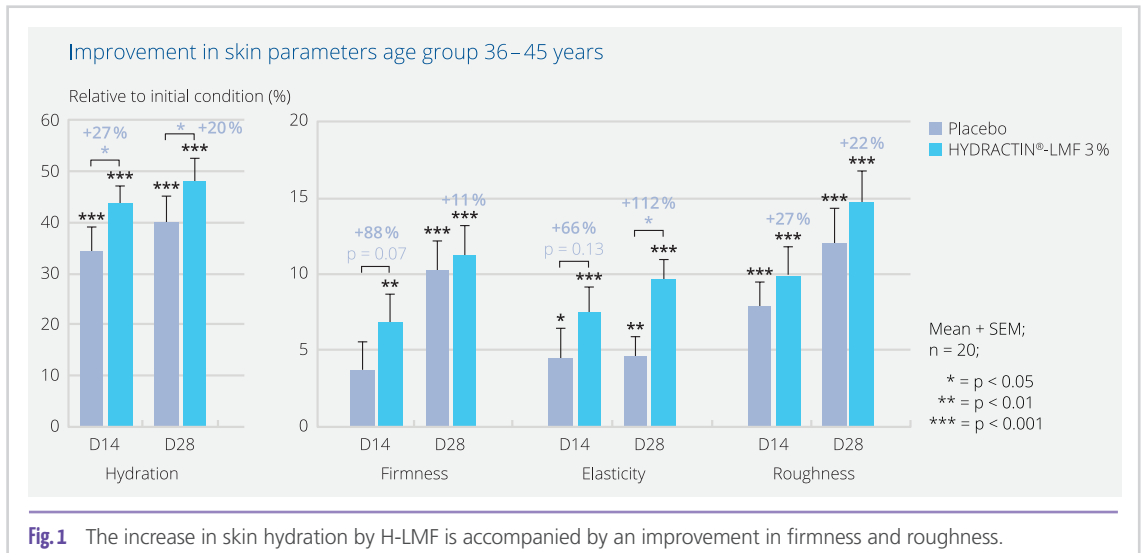
(ZwickRoell, Germany). Hair was either washed with a shampoo (3 minutes; INCI: Water, Sodium Laureth Sulfate, Cocamidopropyl Betaine, Sodium Chloride, Sodium Benzoate, Potassium Sorbate), treated with a conditioner (3 minutes; INCI: Water, Caprylic/Capric Triglyceride, Cetearyl Alcohol, Citric Acid, Polyglyceryl-3 Dicitrate/Stearate, Glyceryl Stearate, Sodium Benzoate, Potassium Sorbate, Xanthan Gum, Sodium Stearoyl Glutamate) or a leave-on formulation (30 minutes; INCI: Water) that contained either no or 0.5% AQUARICH®.

## Results

As expected, skin hydration is increased by the application of a cosmetic base after 14 and 28 days of regular use. This moisturisation could be significantly increased by 27 and 20 respectively compared to the placebo, up to plus 48% compared to the baseline condition, by using HYDRACTIN®-LMF (referred to as H-LMF; **Figure 1**). Similar values were also achieved for an older panel (56 - 65 years) (not shown). Using the moisturising formulation also had a rejuvenating effect as measured by skin firmness and roughness. Firmness increased significantly by 11% and roughness decreased significantly by 14%. In each case, incorporation of the active ingredient showed significant improvements over placebo.

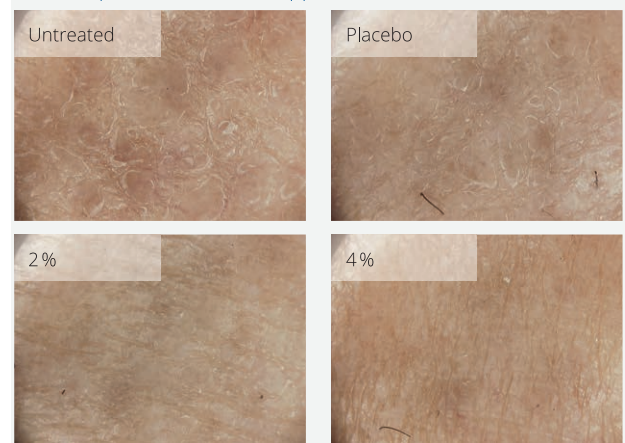
In a leg study on test subjects with very dry skin, the effect of a “physical” moisturising factor was impressively determined. While the untreated skin continued to look dry and scaly, only a slight improvement could be achieved with placebo. Significant improvements were achieved with the use of 2 and 4% AQUARICH® (referred to as AQ). No signs of dry skin and scaling were seen after treatment with the active ingredient (**Figure 2**).

AQ at a concentration of only 0.2% caused a remarkable reduction in the degree of hair damage after application and thus had a very good restructuring effect (**Figure 3**, lower panel). Compared to untreated hair (**Figure 3**, upper panel), treatment with AQ resulted in a smoother, resealed and restored cuticle. The degree of damage was assessed, and the improvement calculated; the results showed that hair damage was alleviated by 40% compared to the untreated sample (data not shown).

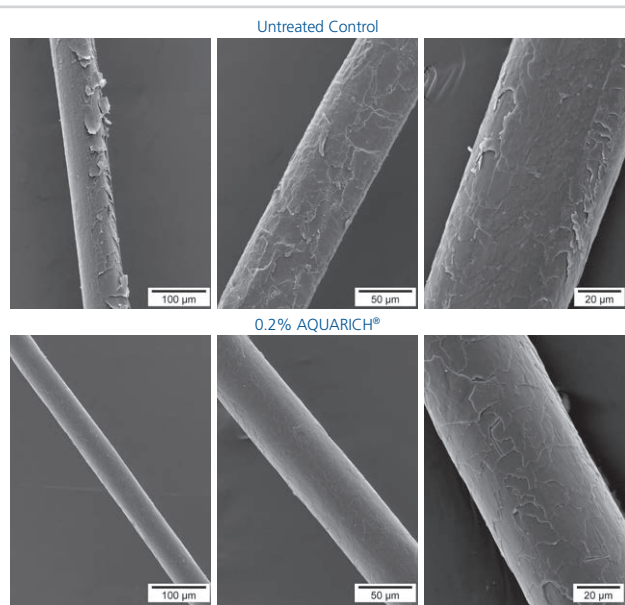


**Fig. 1** The increase in skin hydration by H-LMF is accompanied by an improvement in firmness and roughness.

### Visual improvement of skin appearance



**Fig. 2** AQ intensively moisturises the skin and reduces visible, dry skin flaking.



**Fig. 3** AQ improves the surface structure of the damaged hair.

Treatment with 0.5% AQ shampoo increased the measured shine by more than 50% after only one treatment cycle com-

pared to placebo. Gloss was increased by 105% after the fifth wash. The results are shown in **Figure 4**.

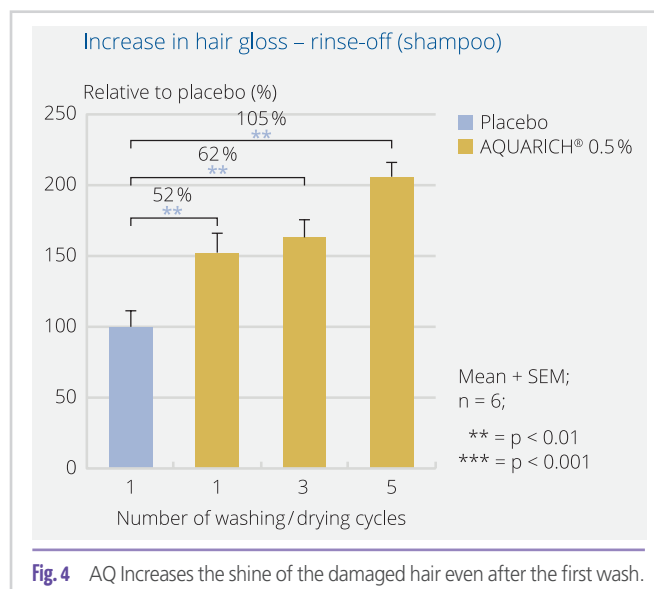
Treatment with 0.5% AQ shampoo resulted in a 9% increase in tensile strength after only one wash cycle compared to placebo. With increasing number of wash and dry cycles, the tensile strength did not change even after the fifth wash (data not shown). Tensile strength after a single application of 0.5% AQ in a conditioner formulation resulted in an increase in tensile strength of more than 13%. The leave-on treatment resulted in a 30% increase in tensile strength. Our results also showed a dose-dependent mode of action. The 0.25% AQ treatment also halved the tensile strength effect (data not shown). The summary results of the different treatment types are shown in **Figure 5**.

## Discussion

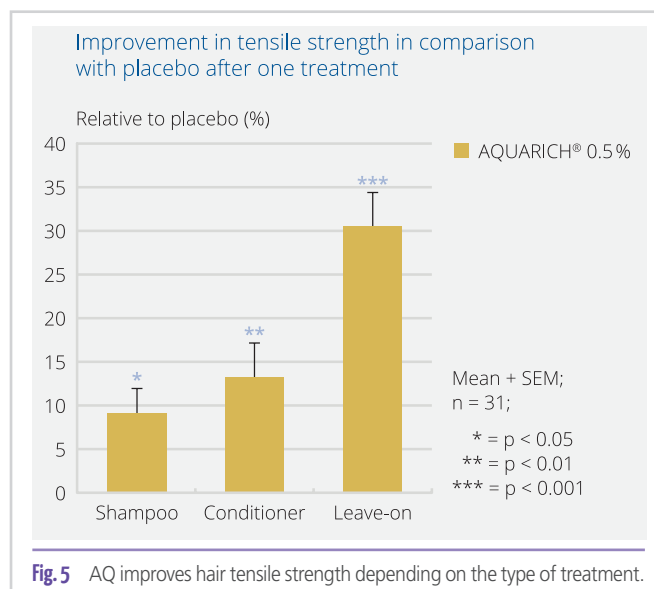
Both active ingredients were able to achieve a significant improvement in the condition in studies on the skin. H-LMF, an active ingredient from the fern *Polypodium vulgare*, the lichen *Cetraria Islandica* and the moss *Sphagnum magellanicum* improved both moisturising and ageing parameters. In 2010, *Hillebrand et al.* impressively demonstrated the connection between skin moisturisation and skin ageing. In a study with 122 test persons, it could be shown that skin with below-average moisturisation forms significantly more wrinkles in 8 years than skin with above-average moisturisation [4]. The result of the anti-ageing effectiveness of the active ingredient can be seen in this context. The increased skin moisturisation had a direct effect on skin firmness and roughness. The active ingredient can thus ensure a lasting feel-good skin through long-term increased moisture. Polypodines from the polypodium fern have an adaptogenic effect and stimulate the production of skin lipids and NMF. Lichenans from the lichen can have an immediate effect on skin moisturisation and skin feel. The other active ingredient presented here (AQ) was produced on the basis of lecithin and *Avena Strigosa* Extract. The extract from the rare black oat contains effective amounts of amino acids that supplement the natural moisturising factor NMF. The application on dry skin on the leg impressively proved the effectiveness. Very dry, scaly skin could be returned to normal after 14 days, whereas this was not the case with placebo.

Both active ingredients can therefore contribute to moisturising the skin with very different approaches.

AQ also embodies an excellent solution for the hair. It supports the texture of the hair with numerous amino acids and it is also surface-active and water-loving. This has also been confirmed in our studies. With very low concentrations of effect, we were able to clearly seal and smooth the cuticle. This also led to an increase in shine of the hair right after the first wash. The amino acids were responsible for the higher tensile



**Fig. 4** AQ Increases the shine of the damaged hair even after the first wash.



**Fig. 5** AQ improves hair tensile strength depending on the type of treatment.

strength of the hair. The increase was dependent on the type of treatment, which proves the effectiveness of AQ.

## References:

- [1] Rawlings AV, Harding CR. Moisturization and skin barrier function. *Dermatol Ther* 2004, 17 Suppl 1: 43-48.
- [2] Choe C, Schleusener J, Lademann J, Darvin ME. Keratin-water-NMF interaction as a three layer model in the human stratum corneum using in vivo confocal Raman microscopy. *Sci Rep* 2017, 7: 15900.
- [3] Gavazzoni Dias MF. Hair cosmetics: an overview. *Int J Trichology* 2015, 7: 2-15.
- [4] Hillebrand GG, Liang Z, Yan X, Yoshii T. New wrinkles on wrinkling: an 8-year longitudinal study on the progression of expression lines into persistent wrinkles. *Br J Dermatol* 2010, 162: 1233-1241.

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# Anti-inflammatory and Scalp Care Efficacy of a Multi-herb Extraction against *Malassezia furfur*

Yina Lu, Heng Zhang, Jun Tian

## abstract

*Malassezia furfur* is a lipophilic and dermatological pathogenic yeast, which normally exists on human skin, and causes tinea versicolor, seborrhoeic dermatitis, and atopic dermatitis, especially on human scalp. The multi-herb extraction VGP which consists of *Vitex trifolia* fruit, *Gentiana scabra*, and *Polygonum multiflorum* root extract was used to study its effect of anti-inflammation, controlling sebum and dandruff on scalp care. Results showed that on the model of NHEK and THP1 cell inflammation induced by *Malassezia furfur*, VGP can inhibit the expression of interleukin 6 (IL-6), prostaglandin E2 (PGE-2), monocyte chemoattractant protein 1 (MCP-1) and interleukin 1 $\beta$  (IL-1 $\beta$ ) in a dose-dependent manner under 0.01% to 0.125% concentration. On the inflammatory model of 3D reconstructed skin induced by H<sub>2</sub>O<sub>2</sub>, VGP significantly improved the cell viability and skin structure, and reduced the production of interleukin 8 (IL-8), PGE-2, and leukotriene B4 (LTB4). During 4 week's treatment with test shampoo contained 0.5% VGP thrice a week on 16 subjects met with different symptom, VGP reduced the sebum content and TEWL, improved the redness, itching and dandruff on human scalp skin. Therefore, as a natural active ingredient VGP can play a role in scalp care and skin care by targeting inflammation.

## Introduction

Human scalp reveals a remarkable difference to hairy skin of other body regions. The structure of the scalp offers effective protection against water loss and contributes to thermoregulation due to significant vascularization. Dandruff is a skin condition that affects the scalp of up to half the world's population, it is characterised by an itchy, flaky scalp and is associated with colonisation of the skin by *Malassezia spp* [1-4].

*Malassezia furfur* is lipophilic and dermatological pathogenic yeast, which normally exists on human skin, and causes tinea versicolor, seborrhoeic dermatitis, and atopic dermatitis, especially on human scalp [5-7]. These *M. furfur*-related diseases are often difficult to treat and require prolonged use of antifungal and anti-inflammatory medications [8-10]. However, recently available antifungal drugs to treat this fungal infection are highly toxic and costly when used in prolonged treatments. A promising approach for developing new cutaneous antifungals may lie with natural plants because of their ability to efficiently kill microbial pathogens and high-security [11].

*M. furfur* was reported to induce the inflammatory response and activation of keratinocyte and monocyte in host [12,13]. The epidermis composed of keratinocytes is a physical barrier to external pathogens. Keratinocytes act as initiators of innate immunity by producing interleukin (IL)-1 $\alpha$ , IL-1 $\beta$ , IL-6, tumor necrosis factor (TNF)- $\alpha$  and

prostaglandin E2 (PGE-2) [14] propagating in acute and chronic response. The important immune system T helper (Th) cells are mainly triggered by cytokines from dermal monocytes and macrophages. When monocytes polarize to macrophages, cells recognize parasitical antigens and secrete proinflammatory cytokines such as TNF- $\alpha$ , IL-6, IL-8, IL-1 $\beta$ , IL-4, PGE-2 and monocyte chemoattractant protein 1 (MCP-1) [15-18], which act as encounters and activate antigen-specific natural killer T cells in a process known as the Th1 response, to mediated inflammatory responses of immune system.

The antimicrobial and anti-inflammatory characteristics of plant extracts in Asia have been studied and applied for thousands of years. We set up a high throughput method by using the heat-killed *M. furfur* culture medium to stimulate the monocyte THP-1 cells to select more than 30 herb extraction. Finally the multi herb extraction VGP which consists of *Vitex trifolia* fruit, *Gentiana scabra*, and *Polygonum multiflorum* root extract was prepared. And then the efficacy of anti-inflammation against *M. furfur* in THP-1 and NHEK cells was confirmed. Moreover, its clinical effect was designed in human scalp with symptoms of various problems, such as seborrhoeic dermatitis, dandruff, inflamed and itching scalp.



## Materials and Methods

### VGP Preparation

*Vitex trifolia* fruit extract, *Gentiana scabra* extract and *Polygonum multiflorum* root extract were firstly prepared by water extraction according to previous reports in China. Then the three extracts were dissolved in dipropylene glycol (CAS No. 25265-71-8) at 50°C for 4 h with a special composition, followed by decolorization, impurity removal, deodorization and filtration. Polysorbate 20 (CAS No.9005-64-5) was added to promote the water solubility of VGP, which consist of many active ingredients such as luteolin, rutin, gentiopicoside and resveratrol.

### Maintenance of Cells

Normal human monocyte THP-1 cells and keratinocyte NHEK cells were procured from BN BIO Company (China). Cells were cultured in RPMI 1640 or DMEM medium completed with 10% FBS and 1% PS (penicillin streptomycin solution; Invitrogen, CA) at 37°C in a humidified CO<sub>2</sub> (5%) chamber (Thermo Fisher Scientific, USA).

### Anti-inflammatory experiments on cells

*M. furfur* strains ATCC 44344 (Beijing zhongkezhijian Biotechnology, China) were maintained in LAN medium [19]. The cultures were heat-killed by subjecting to temperatures of 85°C for 30 mins as an inducer of cellular inflammation on THP-1 and NHEK [20]. Cells were seeded in a 96-well plate at a density of 5 or 1×10<sup>4</sup> cells per well overnight. And then were treated with VGP (1% to 0.016% by two-fold dilution), with or without *M. furfur* stimulation for 24 h [20-23]. Cell viability was detected by CCK-8 and MTT (Sigma, USA) assay [23, 24]. MCP-1, IL-1β, PGE-2 and IL-6 were determined with the corresponding ELISA kit (Neobioscience, China) using the culture medium.

### Anti-inflammatory experiments on 3D reconstructed skin

The *M. furfur* and H<sub>2</sub>O<sub>2</sub> (100 mM) was applied in the epidermis of 3D reconstructed skin (Episkin Biotechnology, China) for 30 min, and then VGP with different concentration from 0.25% to 2.0% was added to the surface, cocultured with Episkin for another 42 h [25]. After treatment, the skin biopsy was measured by HE staining, and ELISA was used to detect the expression of cytokines (IL-8, LTB4 and PGE-2) in the supernatant. Cell viability was tested by MTT assay according to manual [26].

### Scalp care test *in vivo*

A clinical study of 16 subjects was performed to evaluate the effects of VGP on scalp [27]. In recuperation period, vehicle shampoo was used to balance and maintain the condition of scalp in two weeks. During 4 week's treatment, participants



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applied test shampoo (contained 0.5% VGP) thrice a week. Photos were taken and data were collected by Vapometer and Submeter at the following time points: baseline ( $T_{0w}$ ), recuperation ( $T_{2w}$ ), after 2 and 4 weeks of use ( $T_{4w}$  and  $T_{6w}$ ). The redness and dandruff was valued by a dermatologist according to ASFS criterion, while the itching was evaluated by consumer through questionnaire survey.

### Statistical Analysis

All experiments were repeated at least three times with different batches of cells. Data were evaluated statistically using Student's t-test, and the statistical significance was set at  $P < 0.05$ .

## Results

### Anti-inflammatory efficacy of VGP against *M. furfur* on cells

The toxicity of VGP on THP-1 and NHEK cells were detected firstly. As shown in **Table 1**, it has toxicity on both THP-1 and NHEK when above 0.25%, while the cell viability was reached to 80% under the concentration of 0.125%.

Focusing on the inflammation stimulated by *M. furfur* on NHEK cells, the expression of cytokines, such as IL-6 and PGE-2 were significantly up-regulated (**Figure 1**, M.f). When co-cultured with VGP from 0.016% to 0.125% for 24 h, the secretion of IL-6 was reduced from 36.8 to 18.9 pg/ml, PGE-2 from 1228.3 to 542.0 pg/ml as well. And the inhibitory effect was stronger when compared to dipotassium glycyrrhizinate (DG) at 0.125% (**Figure 1**, Ref).

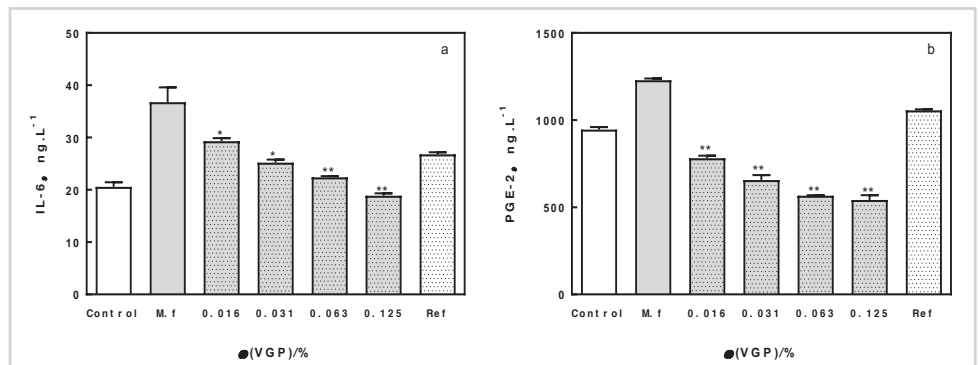
On THP-1 cells, the secretion of MCP-1, IL-1 $\beta$  and PGE-2 were also promoted by *M. furfur*. As seen in **Figure 2**, the expression of MCP-1 was from 92.9 to 368.4 pg/ml, IL-1 $\beta$  from 14.0 to 64.3 pg/ml and PGE-2 from 22.2 to 65.3 pg/ml after *M. furfur* stimulation (M.f). When treated with VGP from 0.016% to 0.125% for 24 h, the secretion of MCP-1, IL-1 $\beta$  and PGE-2 were down to 138.9, 9.7 and 26.9 pg/ml respectively, while the inhibitory effect of DG under 0.125% concentration was weakened than VGP, especially for MCP-1 and PGE-2. Results strongly supported VGP's anti-inflammatory effect on epidermal keratinocytes and dermal monocytes.

### VGP inhibited the inflammation and cell damage on reconstructed skin

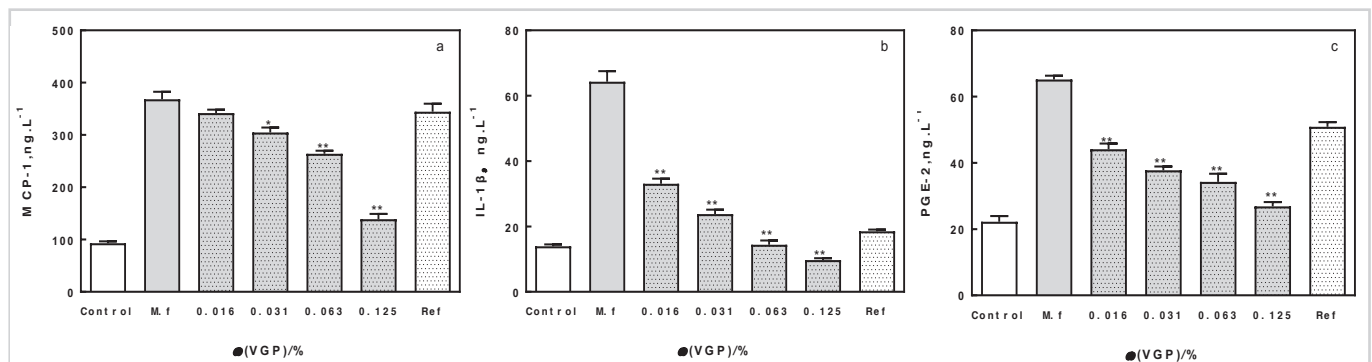
*M. frufur* can't induce inflammation on Episkin model even in high concentration treated for 24 to 42 h (data not shown), while  $H_2O_2$ , a peroxide often used in hair dyeing

Cell Viability %	$w(VGP),\%$				
	0	0.0625	0.125	0.25	0.5
<b>NHEK</b>	100.00 $\pm$ 1.75	95.19 $\pm$ 3.10	88.31 $\pm$ 3.75	30.58 $\pm$ 1.32	5.68 $\pm$ 0.27
<b>THP1</b>	100.00 $\pm$ 1.87	96.07 $\pm$ 0.78	84.23 $\pm$ 0.50	29.21 $\pm$ 1.10	20.66 $\pm$ 1.47

**Tab.1** Effect of VGP on the viability of two cells



**Fig.1** The effect of VGP on cytokines induced by *M. furfur* in NHEK cells (\* Significant differences compared to M.f group,  $P < 0.05$ ; \*\*  $P < 0.01$ )



**Fig.2** The effect of VGP on cytokines induced by *M. furfur* in THP1 cells (\* Significant differences compared to M.f group,  $P < 0.05$ ; \*\*  $P < 0.01$ )

and perming, promoted the cell damage and secretion of cytokines, such as LTB<sub>4</sub>, PGE-2 and IL-8 [28-30]. In addition, these inflammatory factors can act on various receptors on the c-type nerve fibers of the skin, transmitting itching and pain [31-33] to cause various scalp trouble.

Firstly, MTT and HE stain was used to verify the cell damage and structure. Cell viability was decreased to 82.66% after 100 mM H<sub>2</sub>O<sub>2</sub> treatment, and the tight junction and cell number of *stratum basale* was get worse than control when stained with HE (Figure 3, a). The Episkin after 42 h VGP exposure with different dosages was becoming same as control both in cell viability and HE stains.

Furthmore, the amount of LTB<sub>4</sub> and PGE-2 release at 42 h after the addition of H<sub>2</sub>O<sub>2</sub> and VGP was investigated. A significant increase in the amount released was observed depending on the 100 mM of H<sub>2</sub>O<sub>2</sub>, moreover, a significant decrease was observed depending on the concentration of VGP (Figure 3, b and c).

### VGP reduced the itching and redness of human scalp skin

The clinical trial results indicated a higher incidence of improvement with VGP than with the vehicle. When applied with test shampoo (0.5% VGP) for 4 weeks, the TEWL and sebum content was reduced from 18.9 to 16.1 and 71.9 to 43.5 respectively in Figure 4.

As shown in Table 2, the dandruff value of ASFS was from 1.98 to 0.47 when treatment with test shampoo for 4 weeks; meanwhile the score of redness and itching was from 2.31 to 0.75 and 3.21 to 1.75 severally in T zone.

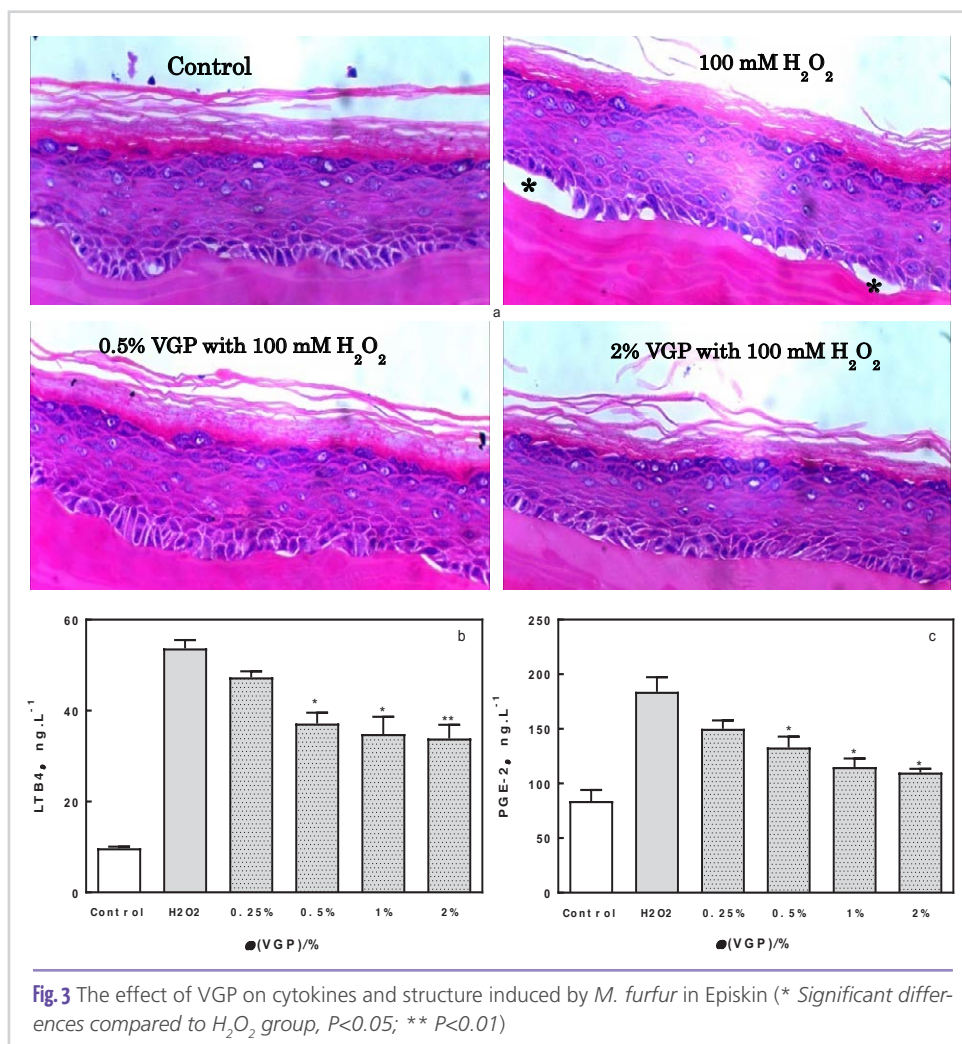


Fig. 3 The effect of VGP on cytokines and structure induced by *M. furfur* in Episkin (\* Significant differences compared to H<sub>2</sub>O<sub>2</sub> group, P<0.05; \*\* P<0.01)

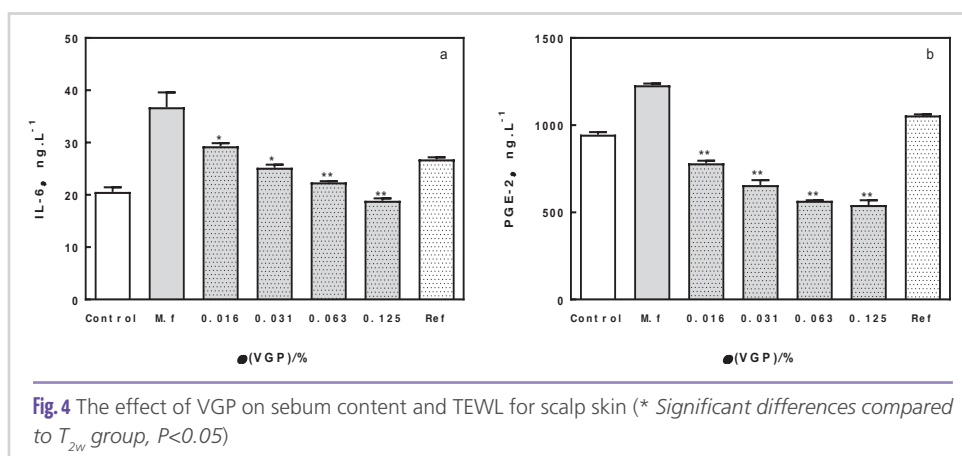


Fig. 4 The effect of VGP on sebum content and TEWL for scalp skin (\* Significant differences compared to T<sub>2w</sub> group, P<0.05)

	Before use	Without VGP	0.5% VGP	
	T <sub>0w</sub>	T <sub>2w</sub>	T <sub>4w</sub>	T <sub>6w</sub>
<b>Redness</b>	2.21±1.00	2.31±0.90	1.46±0.90**	0.75±0.40**
<b>Dandruff</b>	1.85±1.20	1.98±1.40	1.41±1.30*	0.47±0.30**
<b>Itching</b>	3.14±0.90	3.20±1.00	2.23±1.10**	1.75±1.20**

Tab. 2 The effect of VGP on scalp redness, dandruff and itching (\* Significant differences compared to T<sub>2w</sub> group, P<0.05; \*\* P<0.01)

## Discussion

*Malassezia* was previously concluded their ability to evoke cytokine production by human keratinocytes and monocytes [12-13, 34-35]. *M. furfur* as lipophilic and dermatological pathogenic yeast causes various scalp troubles, such as dandruff, seborrheic dermatitis and itching [5-6, 36-37]. In this paper we demonstrated that heat-killed *M. furfur* enhanced lots of cytokines production from both human monocytic and epidermal cell lines at the protein level to cause cell inflammation. But even live cells of *M. furfur* and heat-killed ones could not induced strong activity of cytokine production in human reconstructed skin, while the peroxide H<sub>2</sub>O<sub>2</sub> stimulated cell damage and inflammation dose dependently.

Furthermore, more than 30 extracts from plants were identified in the model of *M. furfur* enhanced cellular inflammation to screen the positive candidates for scalp troubles. We confirmed the VGP which consist of *Vitex trifolia* fruit, *Gentiana scabra*, and *Polygonum multiflorum* root extract with a special proportion, had the best anti-inflammatory effect against *M. furfur*. This study clarified that the expression of inflammatory cytokines in NHEK and THP1 cells in response to *Malassezia* was significantly inhibited, including IL-6, MCP-1, IL-1 $\beta$  and PGE-2. For the cytotoxicity and cytokines on addition of 100 mM H<sub>2</sub>O<sub>2</sub> was observed after 42 h, VGP moderated epidermal basal condition and tight junction, decreased the content of LTB4 and PGE-2 as well. The *in vivo* test confirmed VGP's effect targeting scalp inflammation and condition. Applied test shampoo contained 0.5% VGP for 4 weeks, the TEWL and sebum content value was decelerated on subjects, the score of dandruff, redness and itching was improved at the same time. These results suggest that the anti-inflammatory effect of VGP on human scalp responded to *Malassezia* and peroxide. More studies are necessary to elucidate the mechanism of VGP in keratinocytes and immunocytes to explain its pathways and interactional network.

## Conclusion

VGP, a multi-herb extraction, showed a better efficacy than DG on the inflammatory model of NHEK and THP-1 cells induced by *Malassezia furfur*. On the cell damage and cytokine release of Episkin induced by H<sub>2</sub>O<sub>2</sub>, VGP also improved the cell number and tight junction of basal layer, reduced the amount of cytokines such as LTB-4 and PGE-2. In human scalp, VGP balanced the microenvironment to improve the TEWL, sebum content, inflammation and dandruff. Therefore, VGP can play a role in scalp care and skin care by targeting inflammation as a natural active ingredient.

## References:

- [1] Wei S Y, Du Y J, Li L, et al. Progress in research work field with respect to the mechanism of dandruff and biochemical changes of dandruff scalp [J]. China Surfactant Detergent & Cosmetics, 2017, 47(12): 713-718.
- [2] Gaitanis G, Magiatis P, Hantschke M, et al. The *Malassezia* genus in skin and systemic diseases [J]. Clinical microbiology reviews, 2012, 25(1):106-141.
- [3] Kerr K, Darcy T, Henry J, et al. Epidermal changes associated with symptomatic resolution of dandruff: biomarkers of scalp health [J]. International Journal of Dermatology, 2011, 50(1):102-113.
- [4] Turner G A, Hoptroff M, Harding C R. Stratum corneum dysfunction in dandruff [J]. International Journal of Cosmetic Science, 2012, 34(4):298-306.
- [5] Narifumi A, Hirohiko A, Shiori T, et al. Increased hydrophobicity in *Malassezia* species correlates with increased proinflammatory cytokine expression in human keratinocytes [J]. Medical Mycology, 2012, 50 (8): 802-810.
- [6] Tatsuya S, Aiko T, Naohito O, et al. Enhancement of IL-8 production from human monocytic and granulocytic cell lines, THP-1 and HL-60, stimulated with *Malassezia furfur* [J]. FEMS Immunology & Medical Microbiology, 2000, 28 (2): 157-162.
- [7] Thomas DS, Ingham E, Bojar RA, et al. *In vitro* modulation of human keratinocyte pro- and anti-inflammatory cytokine production by the capsule of *Malassezia* species [J]. FEMS Immunology & Medical Microbiology, 2008, 54(2):203-214.
- [8] Gaitanis G, Bassukas ID, Velegraki A. The range of molecular methods for typing *Malassezia* [J]. Current Opinion in Infectious Diseases, 2009, 22(2):119-125.
- [9] Gupta AK, Batra R, Bluhm R, et al. Skin diseases associated with *Malassezia* species [J]. Journal of the American Academy of Dermatology, 2004, 51(5):0-798.
- [10] RyuS, Choi SY, Acharya S, et al. Antimicrobial and anti-inflammatory effects of Cecropin A(1-8)-Magainin2 (1-12) hybrid peptide analog p5 against *Malassezia furfur* infection in human keratinocytes [J]. Journal of Investigative Dermatology, 2011 (131): 1677-1683.
- [11] Filip R, Davicino R, Anesini C. Antifungal activity of the aqueous extract of *Ilex paraguariensis* against *Malassezia furfur* [J]. Phytotherapy Research Ptr, 2010, 24(5): 715-719.
- [12] Yoshio I, Takashi S, Akemi N. Cytokine secretion profile of human keratinocytes exposed to *Malassezia* yeasts [J]. FEMS Immunology & Medical Microbiology, 2006, 48 (3): 400-409.
- [13] Suzuki T, Ohno N, Ohshima Y and Yadomae T. Soluble mannan and L-glucan inhibit the uptake of *Malassezia furfur* by human monocytic cell line, THP-1. FEMS Immunol. Med. Microbiol, 1998, 21: 223-230.
- [14] Ansel J, Perry P, Brown J, et al. Cytokine Modulation of Keratinocyte Cytokines [J]. Journal of Investigative Dermatology, 1990, 94(s6): 101s-107s.
- [15] Chen CC, Lin MW, Liang CJ, et al. The Anti-Inflammatory Effects and Mechanisms of Eupafolin in Lipopolysaccharide-Induced Inflammatory Responses in RAW264.7 Macrophages [J]. Plos One, 2016, 11(7): e0158662.
- [16] Bischofberger AS, Dart CM, Perkins NR, Dart AJ. A preliminary study on the effect of manuka honey on second-intention healing of contaminated wounds on the distal aspect of the forelimbs of horses. Vet Surg, 2011, 40: 898e902.
- [17] Chen CC, Yan SH, Yen MY, et al. Investigations of kanuka and manuka essential oils for *in vitro* treatment of disease and cellular inflammation caused by infectious microorganisms [J]. Journal of Microbiology, Immunology and Infection, 2014, 49: 104-111.
- [18] Chen YC, Kuo CH, Tsai YM, et al. Suppressive effects of metformin on T-helper 1-related chemokines expression in the human monocytic leukemia cell line THP-1 [J]. Endocrine Research, 2018:1-7.
- [19] Van Belkum A. Monitoring spread of *Malassezia* infections in neonatal intensive care unit by PCR-mediated genetic typing [J]. J Clin Microbiol, 1994, 32: 2528-2532.
- [20] Thomas D S, Ingham E, Bojar R A, et al. *In vitro* modulation of human keratinocyte pro- and anti-inflammatory cytokine production by the capsule of *Malassezia* species [J]. Pathogens & Disease, 2010, 54(2):203-214.
- [21] Lu Y N, Wang G Y, Xie H, et al. Efficacy study of antisebum GMP in the treatment of acne vulgaris [J]. China Surfactant Detergent & Cosmetics, 2019, 49(1): 29-33.
- [22] Donnarumma G, Paoletti I, Buommino E, et al. *Malassezia furfur* induces the expression of  $\beta$ -defensin-2 in human keratinocytes in a protein kinase C-dependent manner [J]. Archives of Dermatological Research, 2004, 295(11):474-481.

- [23] Suzuki T, Ohno N, Ohshima Y, et al. Soluble mannan and  $\beta$ -glucan inhibit the uptake of *Malassezia furfur* by human monocytic cell line, THP-1 [J]. Pathogens & Disease, 1998, 21(3):223-230.
- [24] Bai S B, Chen H X, Zhong J J, et al. RAW264.7 cell viability via MTT assay and possible factor analysis [J]. China Journal of Modern Medicine, 2011.
- [25] Uchino T, Tokunaga H, Onodera H, et al. Effect of squalene monohydroperoxide on cytotoxicity and cytokine release in a three-dimensional human skin model and human epidermal keratinocytes [J]. Biological and Pharmaceutical Bulletin, 2002, 25(5):605.
- [26] Cohen C, Dossou KG, Rougier A, et al. Episkin: An *in vitro* model for the evaluation of phototoxicity and sunscreen photoprotective properties [J]. Toxicology in Vitro, 1994, 8(4):669-671.
- [27] None. A reliable and relevant method for assessing dandruff product efficacy based on the adherent scalp flaking score (ASFS) [J]. Journal of the American Academy of Dermatology, 2013, 68(4): AB41.
- [28] Cheng Y J, Wang T, Dong C F, et al. The difference of damage to mouse skin caused by different hair dyes [J]. The Chinese Journal of Dermatovenereology, 2015(9): 907-909.
- [29] Ottaviani M, Alestas T, Flori E, et al. Peroxidated squalene induces the production of inflammatory mediators in HaCaT keratinocytes: a possible role in acne vulgaris [J]. Journal of investigative dermatology, 2006, 126(11):2430-2437.
- [30] Luca C, Picardo M, Brcathnach A, et al. Lipoperoxidase activity of Pityrosporum: characterisation of by-products and possible rôle in pityriasis versicolor [J]. Experimental Dermatology, 2010, 5(1):49-56.
- [31] Zanoni T B, Pedrosa T N, Catarino C M, et al. Allergens of permanent hair dyes induces epidermal damage, skin barrier loss and IL-1 $\alpha$  increase in epidermal *in vitro* model [J]. Food and Chemical Toxicology, 2017, 112:265-272.
- [32] Lumpkin E A, Caterina M J. Mechanisms of sensory transduction in the skin [J]. Nature, 2007, 445(7130): 858-865.
- [33] Duan C, Zheng R. Research progress on the mechanism of cutaneous pruritus [J]. Medical Innovation of China, 2017, 14 (11): 136-140.
- [34] Denda M, Sato J, Tsuchiya T, et al. Low humidity stimulates epidermal DNA synthesis and amplifies the hyperproliferative response to barrier disruption: implication for seasonal exacerbations of inflammatory dermatoses [J]. Journal of Investigative Dermatology, 1998, 111(5):873-878.
- [35] Misery L, Loser K, Stander S. Sensitive skin [J]. Journal of the European Academy of Dermatology and Venereology, 2016, 30:2-8.
- [36] Ro B I, Dawson T L. The role of sebaceous gland activity and scalp microfloral metabolism in the etiology of seborrheic dermatitis and dandruff [J]. Journal of Investigative Dermatology Symposium Proceedings, 2005, 10(3):194-197.
- [37] Plotkin L I, Mathov I, Squiquera L, et al. Arachidonic acid released from epithelial cells by *Malassezia furfur* phospholipase A2: a potential pathophysiological mechanism [J]. Mycologia, 1998, 90(2):163-169.

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# No need for expensive scatter loss?

# New Method for Connecting Sunscreens with Consumers via a Relative Eco-score

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## abstract

In sun care products, UV filters are the most important active substances, protecting the user against UV radiation. Recently, these substances have been linked to concerns about application safety and potential harmful effects on the environment. Ample human safety data and environmental compatibility studies are available already, but nevertheless, the debate about the possible impact of UV filters, in particular in relation to coral systems, has received widespread public attention. Consumers want to make the best choices for protecting the environment, but that is only possible with deep expert knowledge. The aim of this project, therefore, was to create an easy-to-comprehend information system, and ideally a logo as well, to facilitate decision-making. The system needs to use all available knowledge on the eco-compatibility features of UV filters and connects all available data in a transparent and logical manner. A newly developed computer-aided system helps sunscreen developers to design, or simply rate and compare their sunscreen products. The option of comparing products to a virtual eco-benchmark, based on the median of an eco-score distribution of hundreds of marketed sunscreens, takes comparison to a new level. Public product databases were analyzed with a smart algorithm to derive the necessary individual sunscreen eco-scores. The result of this comparison is an easy-to-comprehend, relative eco-label, designed to connect directly with consumers and to give them the choice of purchasing the best available products for the environment.

## UV filters are in the spotlight of health and environmental matters and consumer judgement

In sun protection products, UV filters are the active components that help protect human skin against harmful solar UV radiation [1]. A limited number of substances are available for this purpose, as they need to receive official approval for use from governmental or regulatory bodies [2]. These authorities assess potential candidates for their safety for use in humans [3], with the help of toxicological data generated in a similar way to the procedure for registering pharmaceutical ingredients. Regional registration processes differ from each other to a certain extent, however, they always involve significant financial and experimental input next to the risk of failing to meet safety criteria. Therefore, only a limited number of compounds are permitted for use in sunscreens as "UV filters".

The environmental features of UV filters are taken into account by various governmental associations. For example, as an EU body, the European Chemicals Agency (ECHA, <https://echa.europa.eu/de/>) controls toxicological and environmental data for the purposes of assessing, determining and regulating occupational safety and the safety of transporting and labeling chemicals [4]. Listed substances are constantly re-examined, e.g. depending on their use volume. Within this process, the substance may be transferred to the "Community Rolling Action Plan" (CoRAP) [5] for substance evaluation by ECHA, or upon request from a member state. Currently, 9 of the 29 UV filters (not counting registered Nano-Forms) approved in the

EU are on the CoRAP list (November 2021) for various reasons. Other authorities around the world observe new evaluations initiated by the ECHA, the US Food and Drug Administration (FDA, <https://www.fda.gov/>) or the US Environmental Protection Agency (EPA, <https://www.epa.gov/>) and use the outcome as the basis for local approval processes. Due to these regulatory processes, it can take several years for a new UV filter to be approved, or sometimes, a reassessment may be executed, potentially leading to adjustments being made to the approval.

On the plus side, if a compound has met all these regulatory requirements, a lot of data will be available about its impact on human health, its safety and its environmental features.

UV filters, in the form of sunscreens, are a class of compounds that will feature in almost everyone's life, because people enjoy to spend time in the sun, and most of us require protection UV light. UV filters are also an essential cornerstone in the fight against skin cancer [6], a disease that costs our health care system billions of Euro [7] – even in its non-deadly form, non-melanoma skin cancer – and costs human lives in its most deadly form [8]. Moreover, the incidence rate for both types of cancer is constantly on the rise [9]. UV filters are therefore not only important functionals, but also some of the most popular ingredients in the cosmetics and OTC industries.

The popularity of UV filters puts them in the spotlight within various research facilities and committees tasked with investigating additional features or revisiting data and unaddressed data gaps for this compound class. It is not unusual for these

activities to lead to the postulation of hypotheses on new hazards in relation to sunscreen use for humans and environment. Such news naturally spreads fast as consumers tend to form a personal connection almost instantly, overlooking the point that in many cases the “hazard” communicated is only potential and a thorough risk analysis including an exposure scenario is missing [10, 11]. This creates confusion on how best to use sunscreens. In its extreme, consumers follow the “avoidance principle”, ignoring that, in the case of sunscreens, this principle is seldom “risk free” and instead comes with an enhanced risk of skin cancer.

What is required is an easy-to-comprehend information system that helps consumers make educated environmental choices, but that intrinsically contains a risk-based approach. It needs to be transparent and logical in the way it condenses available and necessary environmental safety data to indicate ecological compatibility. It also needs to be free of manufacturer bias; because the chances of consumers accepting an information system initiated and supported by the UV filter manufacturing industry or sunscreen makers are low. Additionally, this system should be able to stimulate and drive the whole industry towards higher eco-compatibility constantly. Above all however, it needs to be easy to understand instantly; because consumers should not need to become environmental safety experts to select a product.

Earlier attempts have already been made [12-14]. These systems are based on the environmental safety data required to register products and compounds for importing, transporting and handling in the EU, other regions, or for internal assessment purposes. Their eco-features are therefore derived from OECD guideline conformance studies, with a high degree of reliability and credibility, and transformed via weighing factors into a single eco-impact scale and an individual number for the sunscreen in question. It has not been easy to educate consumers about sun protection factor (SPF numbers) and still, decades after their introduction, about 50% of people do not understand what SPF numbers mean [15]. It is reasonable to predict, therefore, that introducing a second number to a sunscreen bottle – and one that is even more complex to comprehend due to the numerous data it is calculated from – would be likely to fail.

There is also another disadvantage to introducing an absolute scale for the eco-impact of sunscreens, because even the best sunscreen in such a system cannot have zero impact. Paracelsus once said that “the dosage makes the poison” [16], so in reality a sunscreen may indeed have zero impact depending on exposure level. However, with an absolute scale that naturally does not consider such an exposure level, the “impact” will be different from zero. The straightforward conclusion consumers draw from this may lead directly to their applying the avoidance principle: “no sunscreen, no impact!”. From the perspective of human health, and for a class of consumer products that already lacks good use compliance, this would be an undesirable endpoint.

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Therefore, what is needed is:

- A scoring system that connects necessary environmental impact data transparently and logically. It should also penalize any still existing data gaps by using the worst-case assumption.
- A system that can be expanded for future additional environmental data
- An analysis of the current situation on the market regarding the eco-impact of sunscreens
- A comparison of individual sunscreen composition to the market average
- A non-digital graphical interface that relays all this information to consumers, ideally instantly and in a self-explanatory way
- A tool to enable sunscreen developers to plan and design formulas for a desired eco-label and to rate products made.

### Three steps to eco-friendly sun protection – how does it work?

To achieve the above requirements we created a new, sequential three-step, environmental evaluation system (**Figure 1**). Step 1 evaluates individual compounds (UV Filters only at present, but more generally it is not limited to UV filters); Step 2 assesses the impact these compounds would have on the environment in a sunscreen composition; and Step 3 analyzes how this composition compares to a virtual market average – This benchmarked Eco impact score led then to the corresponding logo for an eco-label.

#### Step 1 – UV Filter evaluation

To generate an evaluation for a UV filter combination, the UV filters must first be analyzed individually. From the REACH registration data stored at ECHA, the sections “Physical & Chemical Properties”, “Environmental Fate & Pathways” and “Eco-toxicological Information” are given particular consideration. It must be noted that the aim is not to carry out a regulatory classification of the raw material. The information normally used for risk assessment, in accordance with Annex XIII of the REACH regulation [4], and the terminology and specifications for classification as stated in the guidance on information requirements and chemical safety assessment [17], serve only as the base dataset. This ensures that

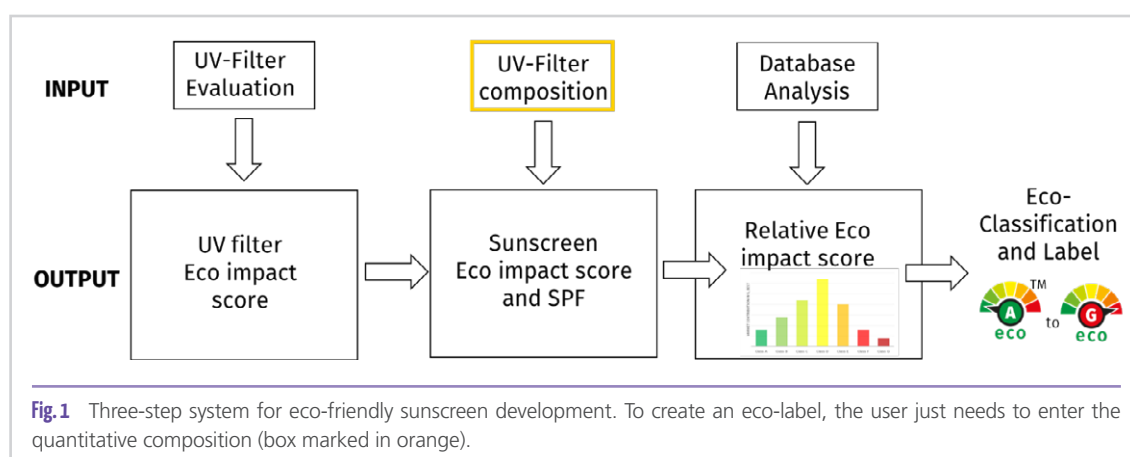
no additional criteria are created unnecessarily. The UV filter is evaluated on the basis of Persistence, Bioaccumulation and Toxicity (PBT) parameters. The T parameters used are:

- Effects of the substance on fish with short term exposure (Acute Tox Fish)
- Effects of the substance on fish with long term exposure (Chronic Tox Fish)
- Effects of the substance on invertebrates with short term exposure (Acute Tox Invertebrates)
- Effects of the substance on invertebrates with long term exposure (Chronic Tox invertebrates)
- Effects on algae, water plants
- Effects on aquatic microorganisms

Based on these endpoints, a UV filter can currently collect 100 points as the maximal score value. These are divided into 20 points each for persistence (P) and bioaccumulation (B). For the six toxicological analyses, 10 points per endpoint is permitted. This 20/20/60 system gives a significant weight to the toxicological evaluations in relation to the P and B criteria. The count is positive, so a substance with a high score, for example, has better environmental compatibility - or lower toxicity or impact. In the ideal case of a value of 100, a substance is readily biodegradable, not bioaccumulative, and all toxicological tests resulted in no detected effects. In the case of deviations, the score is awarded in accordance with **Table 1**.

Rules define how the score is allowed to be lowered in the case of only indicative or less supportive experimental setups [18], e.g. in silico analysis, data bridging, classification of the substance by ECHA as Acute / Chronic Aquatic Toxic Class 1. In line with the commonly used practice of the toxicological worst-case scenario, no points are given if no data is available (Score = 0).

Special cases are represented by the lack of chronic datasets under certain circumstances. These studies may have been waived by the applicants, as they are not mandatory for regulatory classification in the case of negative acute datasets. The rules shown in **Table 2** apply in those cases where a UV filter is classified as “readily biodegradable” or regarded as





“water-soluble”. In cases with no detected effect (negative result), a bioaccumulation and a chronic effect is unlikely to appear, and the acute data is sufficiently meaningful and therefore receives a higher weight.

Even if the substance is considered not readily biodegradable, in one special case additional scores are granted (see **Table 1**). In cases where the compound is rapidly hydrolyzed (criteria: half-life less than 10 days) - 10 points (= ½ of maximal score) are allocated for biodegradation/persistence.

With the considerations described above, a UV filter can be assigned an individual score between 0 and 100. The parameters can be expanded as new types of data become available. At present, data on corals lack reproducibility and their applicability is the topic of controversial discussion. However, such data will be included once OECD guidelines on coral safety testing are available.

As a next step, the positive individual score of a UV filter is converted into an environmental impact (EI) parameter. This is done by deducting the score from the maximum number of points (100) (e.g. score = 60, maximum number of points 100: EI = 100-60 = 40).

### Step 2 – UV Filter composition in a sunscreen

UV filter combinations used in a full formulation can therefore be calculated by the sum of all UV absorber impact values combined with the used filter concentration in % by volume as a multiplier:

#### Equation 1:

$$EI_c = \sum_{i=1}^i (100 - SP_i) * c_i$$

- $EI_c$ : Environmental impact of UV absorber composition
- $SP_i$ : Sum of points of UV absorber (i) in the formulation
- $c_i$ : Individual concentration of UV absorber (i) in the combination
- $i$ : Number of UV absorbers in the sun protection combination

Parameter	Result 1	Result 2	Result 3
Result Parameter P Biodegradation	Readily biodegradable	Inherently / ultimately biodegradable	Not biodegradable
<b>Score</b>	<b>20</b>	<b>10</b>	<b>0</b>
Exemption if Parameter P is “non-readily biodegradable”	But substance hydrolysis less than 10 days:		
<b>Score</b>	<b>10</b>		
Result Parameter B Bioaccumulation	Not bioaccumulative Bioconcentration factor (BCF) <2000 L/kg:	No testing, assessment based on <i>in-silico</i> /physical properties, e.g. Log Pow	Bioaccumulative (BCF >2000 L/kg)
<b>Score</b>	<b>20</b>	<b>2.5-10</b>	<b>0</b>
Result Parameter T Acute Tox testing’s	Negative / no effects	Detected effects	Toxic effects
<b>Score</b>	<b>20</b>	<b>2.5-10</b>	
ECHA/WHO Classification as	Acute/Chronic Toxic Class 1	Endocrine Disrupter	
<b>Score</b>	<b>-5</b>	<b>-5</b>	
Parameter independent: if conclusion is based on Quantitative Structure-Activity Relationship (QSAR)/ <i>in-silico</i> /Data bridging/Risk assessment			
	Score: ½ of maximal score		

**Table 1:** Overview of scoring system for individual UV absorbers

Substance Solubility	Result Parameter P Biodegradation	Result Parameter T Acute Tox testing’s	Result Parameter T Chronic test / Chronic result	Score for negative Acute + Bonus
Oil	Readily biodegradable	Negative / no effects	Not necessary due to negative Acute testing / no data	10+2.5
Oil	Not readily biodegradable	Negative / no effects	Not necessary due to negative Acute testing / no data	10+0
Water	Independent of Biodegradation results	Negative / no effects	Not necessary due to negative Acute testing / no data	10+5
Oil or Water	Independent of Biodegradation results	Negative / no effects	Chronic test: negative / no effects	Acute 10 Chronic 10

**Table 2:** Scoring in the case of an absence of chronic datasets based on solubility and result of the P Parameter

$EI_c$  indicates the value for the environmental impact of a specified UV absorber combination within a formulation. This results in absolute values, which facilitates comparison between formulations – the lower the value, the lower a combination’s environmental impact.

### Step 3 – Relative eco-compatibility classification based on market data for existing sunscreens

The environmental impact parameter (EI) already allows comparison between different formulas, albeit with the limitations mentioned in the introduction. The ideal would be comparison to some sort of market average. However, that

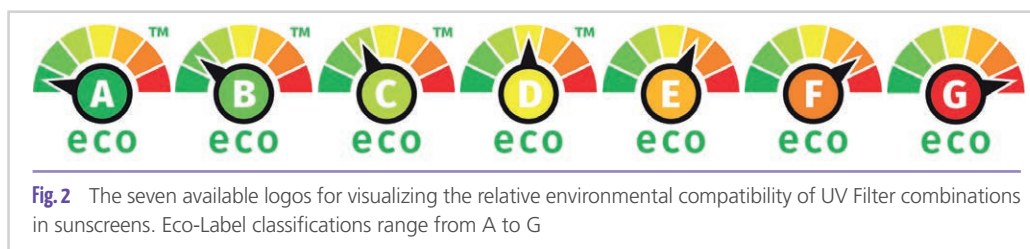
would necessitate a compositional analysis of several hundreds of global or regional marketed products. With such an analysis, a distribution of EIs could be created and from that a reference midpoint could be set. A sunscreen's performance runs more or less parallel to the amount of UV filters used. The more UV filters, the higher the SPF. We therefore chose to analyze the eco-impact of sunscreens by SPF class, in a similar way to how they are defined in the EU (6, 10, 15, 20, 25, 30, 50, 50+) [19] and to create eight independent groups. We performed this analysis using the published compositional data required for labeling and a proprietary algorithm that estimated composition. Based on that, we calculated individual market products  $EI_c$ . For each SPF class, this generated a standardized distribution of  $EI_{cs}$  covering a wider range. The median of this distribution was then used to set the comparison point for calculating individual and relative eco-labels. This process needs to be repeated every three to five years, to keep track of the constantly changing environment in the sun care industry.

We chose a seven-class system in which the mid-point was aligned to the median that resulted from SPF category-specific analysis. A represents the best and G the weakest eco-score. To make it quick and easy to understand the seven eco-scores, we created a series of symbols as visualized in **Figure 2**. A color and clockwise indicator system make the logo instantly understandable to consumers.

### Eco-data calculation system for designing a new formula or rating an existing one

The scoring system and calculations behind the eco-labels have been added to the DSM Sunscreen Optimizer (DSO). The only data required are a sunscreen's quantitative UV filter composition and the calculated or labelled SPF value. Using these data, the system analyzes the eco-score and also performs a comparison with the virtual market benchmark for the SPF class. It then allocates one of the seven possible eco-labels shown in **Figure 2** to a sunscreen. In this way, the DSM Sunscreen Optimizer now makes it possible to design more eco-compatible formulas while simultaneously keeping control over other performance parameters, such as the level of UVA protection, costs, and sensory features, in a multi-dimensional fitting process. **Figure 3** shows examples for SPF 30 and SPF 50+ formulas.

Through experimentation with the DSM Sunscreen Optimizer in silico laboratory, some rules for achieving top-class, A and B eco-labels quickly became apparent (see examples in **Figure 3**). It is important to focus on UV filter systems with high per-



**Fig. 2** The seven available logos for visualizing the relative environmental compatibility of UV Filter combinations in sunscreens. Eco-Label classifications range from A to G

formance, and good eco-compatibility, such as Bis-Ethylhexyloxyphenol Methoxyphenyl Triazine (Bemotrizinol, BEMT), Methylene bis-benzotriazolyl tetramethylbutylphenol (Bisotrizole, MBBT), Phenylbenzimidazol Sulfonic Acid (Ensulizole, PBSA), Ethylhexyl Triazone (Octyl Triazone, EHT) and Butyl Methoxydibenzoylmethane (Avobenzone, BMDBM). The lower dosage needed to achieve performance relative to UV filters with lower absorption is an add-on in terms of eco-compatibility. UV filters with a lower eco-score should be used carefully as from a certain usage level onwards, they significantly reduce the whole formula's eco-label. This is a well-expected consequence of an optimization system like this and a reminder of Paracelsus. With all eco-compatibility in mind, it is also important not to lose track of a sunscreen's other features. An A-label is not of help if the consumer does not appreciate the sensory features of the sunscreen and therefore decides not to use it or only uses it sparingly. Because of this, during the formulation process it is helpful to analyze additional and necessary features simultaneously and to keep control of these alongside the eco-rating.

### Conclusion

Environmental compatibility is a hot topic for sunscreens. Consumers want to make the right choice, but the information they need to make an educated decision is often fragmented, and they lack the deep expert knowledge required to understand scientific study results in any meaningful way. Here, we propose a system that condenses all available data – based on OECD guideline conformance studies – into a score and compares this score to a market benchmark for each SPF class. For an eco-label, we suggest a graphical clock type figure: there is a very high density of information behind this symbol, but it is instantly understandable. With the help of the DSM Sunscreen Optimizer, eco-labels can be calculated either from the composition for existing sunscreens or during the development and design phase for new sunscreens. With the DSM Sunscreen Optimizer it is also possible to estimate SPF and UVA protection performance instantly and in parallel to other relevant performance parameters after data input, for a multi-dimensional optimization process. The beauty of this eco-label is its intrinsic power to push our sunscreen industry towards even higher eco-friendly formulas and new innovations in sun care, supported by the buying decisions of the consumer. This can represent a true commitment to the environment.

References:

[1] Sander M, Sander M, Burbidge T, Beecker J. The efficacy and safety of sunscreen use for the prevention of skin cancer. Canadian Medical Association Journal. 2020;192:1802-8.

[2] Sabzevari N, Qiblawi S, Norton SA, Fivenson D. Sunscreens: UV filters to protect us: Part 1: Changing regulations and choices for optimal sun protection. Int J Womens Dermatol. 2021;7:28-44.

[3] Dréno B, Alexis A, Chuberre B, Marinovich M. Safety of titanium dioxide nanoparticles in cosmetics. Journal of the European Academy of Dermatology and Venereology : JEADV. 2019;33 Suppl 7:34-46.

[4] Parliament E. REGULATION (EC) No 1907/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC. 2006.

[5] ECHA. CoRAP - Community Rolling Action Plan.

[6] Ulrich C, Jurgensen JS, Degen A, Hackethal M, Ulrich M, Patel MJ, et al. Prevention of non-melanoma skin cancer in organ transplant patients by regular use of a sunscreen: a 24 months, prospective, case-control study. Br J Dermatol. 2009;161 Suppl 3:78-84.

[7] Guy GP Jr., Machlin SR, Ekwueme DU, Yabroff KR. Prevalence and costs of skin cancer treatment in the U.S., 2002-2006 and 2007-2011. American journal of preventive medicine. 2015;48:183-7.

[8] Schadendorf D, van Akkooi ACJ, Berking C, Griewank KG, Gutzmer R, Hauschild A, et al. Melanoma. Lancet (London, England). 2018;392:971-84.

[9] Leiter U, Keim U, Garbe C. Epidemiology of Skin Cancer: Update 2019. Advances in experimental medicine and biology. 2020;1268:123-39.

[10] Mitchelmore CL, Burns EE, Conway A, Heyes A, Davies IA. A Critical Review of Organic Ultraviolet Filter Exposure, Hazard, and Risk to Corals. Environ Toxicol Chem. 2021;40:967-88.

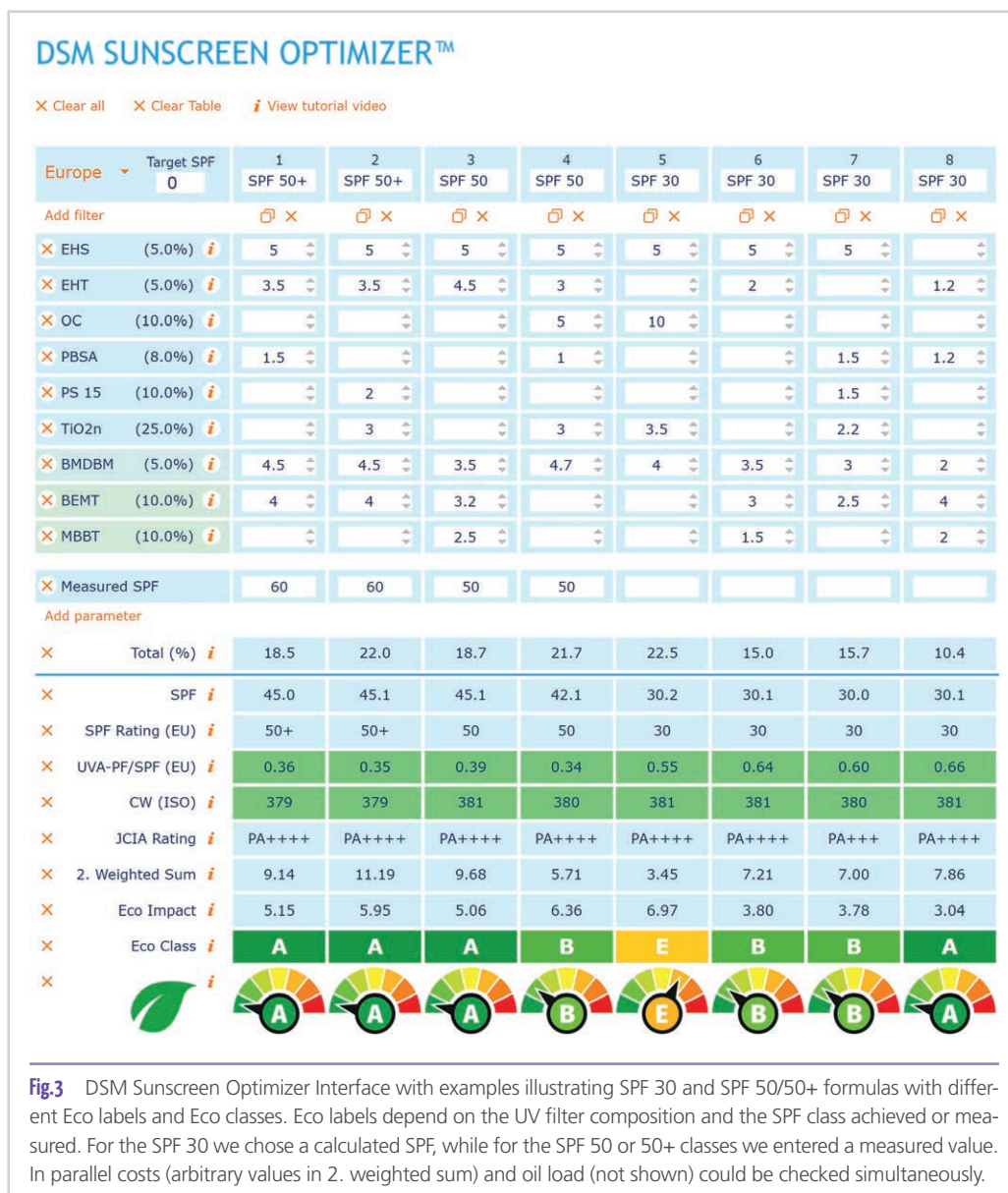
[11] Ramos S, Homem V, Alves A, Santos L. A review of organic UV-filters in wastewater treatment plants. Environment International. 2016;86:24-44.

[12] Pawlowski S, Herzog B, Sohn M, Petersen-Thiery M, Acker S. EcoSun Pass: A tool to evaluate the ecofriendliness of UV filters used in sunscreen products. Int J Cosmet Sci. 2020.

[13] Predal RA, Sharples R, Saxe J. US9595012B2 Method for improving the environmental impact of formulated products. US2010.

[14] Long DC, Martin FH, Weeks JA. US7096084B2: Methods for evaluating chemical components based on their proposed function in the product they are to be used in. US2003

[15] Vollhardt J, Marchini M, Janssen A, Sautova M, Schoop R. P-S2-328: Consumers using less than recommended to optimize the appeal of sunscreens – A consumer habits and practices study compared to the sensorial reality in the market. IFSCC 2018. Munich2018.



**Fig.3** DSM Sunscreen Optimizer Interface with examples illustrating SPF 30 and SPF 50/50+ formulas with different Eco labels and Eco classes. Eco labels depend on the UV filter composition and the SPF class achieved or measured. For the SPF 30 we chose a calculated SPF, while for the SPF 50 or 50+ classes we entered a measured value. In parallel costs (arbitrary values in 2. weighted sum) and oil load (not shown) could be checked simultaneously.

[16] Grandjean P. Paracelsus Revisited: The Dose Concept in a Complex World. Basic & clinical pharmacology & toxicology. 2016;119:126-32.

[17] ECHA. Guidance on information requirements and chemical safety assessment / Chapter R.11: PBT/vPvB assessment. 2017.

[18] Klimisch HJ, Andreae M, Tillmann U. A systematic approach for evaluating the quality of experimental toxicological and ecotoxicological data. Regul Toxicol Pharmacol. 1997;25:1-5.

[19] Commission E. Commission recommendation of 22 September 2006 on the efficacy of sunscreen products and the claims made relating thereto (2006/647/EC). Official Journal of the European Union. 2006.

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# Eco-friendly Ingredients for Biodegradable Cosmetic Products

A. Stork, W. Mauer, A. Ptock

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## abstract

Modern consumers want cosmetic products that are free from ingredients that have a negative impact on the environment. At the same time, consumers also expect products to deliver outstanding performance and attractive sensory properties. Cosmetics manufacturers face challenges when trying to meet these expectations while also operating in line with associated regulatory changes such as those regarding microplastics. New, readily biodegradable and renewable-based innovations such as the opacifier Euperlan® OP White and the stabilizer Lamesoft® Balance offer manufacturers sustainable ingredients for hair and skin cleansing products that are able to match or exceed the performance of traditional ingredients.

## Introduction

The trend toward renewable-based cosmetics that are free from ingredients with a potentially negative environmental impact has been a key driver of change in the cosmetics industry in recent years. This momentum is being generated by increasing public awareness of environmental issues as well as increasingly strict regulation of cosmetics ingredients. However, while eco-conscious consumers now demand sustainable formulations, they are not willing to accept decreased performance or reduced sensorial benefits. They expect products to contain sustainable raw materials that deliver the same properties as traditional ingredients. This creates major challenges for cosmetics manufacturers – and opens up attractive opportunities for companies that manage to meet these high expectations.

Products that claim to be free of microplastics are a high-profile example of this trend. The term “microplastics” generally refers to solid, water insoluble and synthetic polymeric particles that are five millimeters or smaller in size and that are not biodegradable. Most microplastics that enter the environment are generated by the gradual breakdown of plastic waste, while worn-off particles from vehicle tires and synthetic fibers from clothing are also making a significant contribution. Microplastics from cosmetic products contribute less than 1% to the overall microplastic debris in the environment. However, there is a growing regulatory and consumer focus on microplastics in cosmetic products.

National legislation mostly refers to “plastic microbeads,” which can be used for exfoliating and cleansing purposes in rinse-off cosmetics. These microbeads have already been almost completely phased out in Europe due to a voluntary agreement by the European cosmetics industry. There are currently no legislative restrictions at the EU level, however the European Chemicals Agency (ECHA) published a restriction

proposal for microplastics in 2019 [1]. This restriction led to a so-called “final and combined opinion” of the RAC and SEAC committees. Entry into force of the restriction on intentionally added microplastic is expected to take place in 2022. In this restriction, the suggested definition of a microplastic particle uses the umbrella term “polymer,” which does not discriminate between plastic materials that maintain their rigid shape during use and disposal or – on the other hand – functional polymers that do not exist as solid, shaped particles in cosmetic products or after their disposal. As a result, many functional polymers that are commonly used in cosmetic formulations could potentially be banned under this proposal, unless the authorities can be convinced to take a more differentiated view of the specific environmental properties of individual polymers rather than simply judging them all as microplastics.

Another important aspect in the microplastic discussion is the biodegradability of personal care ingredients. Since cosmetic products usually consist of a variety of ingredients, it is necessary to assess the environmental compatibility of every single substance. Some labels such as the EU Ecolabel and the Nordic Swan Ecolabel, which is the official ecolabel in the Northern European countries, define minimum biodegradability requirements for organic cosmetic ingredients. However, the biodegradability of a substance depends solely on its structure, not on whether its starting material is natural/renewable or entirely synthetic. There are a variety of standardized methods available to evaluate the biodegradability of a substance. This makes it all the more important to be transparent about the context in which the biodegradability is assessed. For BASF Personal Care Europe, the OECD 301 standard screening tests produce the most commonly acknowledged results, but other biodegradation tests like ISO are also gaining more and more impact, particularly within the microplastic discussion.

Data from Mintel [2] shows that the number of beauty and personal care products in Europe that feature a microplastic-free claim increased significantly from only 1 product in 2016 to more than 800 products in 2020. In the last 5 years, the share of cosmetic product launches in Germany that claimed to be microplastic-free rose from 0% to more than 4%. In this context, there is rising demand for ingredients that enable formulations to include a microplastic-free claim that is consistent with all relevant regulations. BASF has recently launched two innovations that are empowering cosmetics manufacturers to successfully address this trend. The first is Euperlan® OP White, a wax-based and readily biodegradable opacifier that offers an eco-friendly alternative to synthetic opacifiers in skin and hair cleansing formulations. The second is Lamesoft® Balance, a 100% natural and readily biodegradable ingredient for rinse-off skin and hair cleansing formulations that stabilizes wax-based dispersions and enhances the sensory properties of formulations.

### A sustainable alternative to synthetic polymer-based opacifiers

In 2019, BASF launched a wax-based and readily biodegradable opacifier dispersion for surfactant formulations called Euperlan® OP White. Its INCI name is Glycol Distearate (and

Sodium Laureth Sulfate (and) Cocamidopropyl Betaine (and) Glycerol Oleate. It offers an opaque, pure white appearance. This creates valuable appeal for cosmetic products by giving them a lotion-like appearance, which is associated with mild and soft cleansing properties as well as moisturizing and nourishment claims. Euperlan® OP White complies with the requirements for biodegradability set out by the Organisation for Economic Co-operation and Development standard OECD 301 [3]. In addition, its unique properties also meet the requirements for the eco-label certification of skin and hair cleansing formulations in line with EU Ecolabel, Nordic Ecolabel and Bra Miljöval. Euperlan® OP White contains 90% ingredients of natural origin according to the International Organization for Standardization norm ISO 16128-2. This means that the ingredient is suitable for cosmetic products that are marketed with claims such as being microplastic-free, nature-based and sustainable.

Euperlan® OP White can be used instead of traditional opacifiers based on synthetic petrochemical polymers such as Styrene/Acrylates Copolymer. It delivers an even better pure-white appearance in the final formulation of personal care rinse-off products such as shampoo, shower gel, liquid soap and facial cleansers. In April 2019, Euperlan® OP White was awarded second place in the “Functionals and Recipients”

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sub-category of “Cosmetics” for the BSB Innovation Prize, which is presented by the German consulting agency BSB each year to recognize innovations in the cosmetics sector [4].

## An eco-friendly ingredient for stabilizing rinse-off formulations

Cosmetic manufacturers may also face challenges in stabilizing wax-based rinse-off formulations because commonly used stabilizers often involve synthetic-based polymers, which means the product may possibly not be marketed with claims about being free from microplastic. Lamesoft® Balance is a sustainable alternative that offers a solution to this challenge. It is a 100% renewable-based and readily biodegradable ingredient that offers efficient stabilization of small-sized wax dispersions in rinse-off formulations for skin and hair cleansing products while meeting high expectations for sustainability. Its INCI name is Coco-Glucoside (and) Hydrogenated Castor Oil. It meets the requirements of EU Ecolabel, Nordic Ecolabel and Bra Miljöval. Lamesoft® Balance contains 100% content of natural origin according to ISO norm 16128-2 and is also suitable for natural certified cosmetics formulations in line with the COSMOS and NATRUE standards. Furthermore, it is a suitable alternative to concepts that involve surfactants that contain ethylene oxide and sulfate.

By acting as a natural structure enhancer in surfactant-based systems, this innovative material allows cosmetics manufacturers to stabilize their formulations without using synthetic polymers. This addresses key challenges related to stabilizing fine particle wax dispersions in rinse-off formulations. Lamesoft® Balance is specially designed to stabilize and enhance wax-based opacifiers in rinse-off applications – even in low viscosity formulations. Due to its composition of hydrogenated castor oil and Coco-Glucoside, Lamesoft® Balance is cold processable, easy to formulate and provides a pleasant, homogenous rheology in final formulations.

In addition to this, tests have shown that Lamesoft® Balance offers skin care benefits in body wash formulations and significantly boosts the hair-conditioning effect in shampoos that contain cationic conditioners. The product is suitable for var-

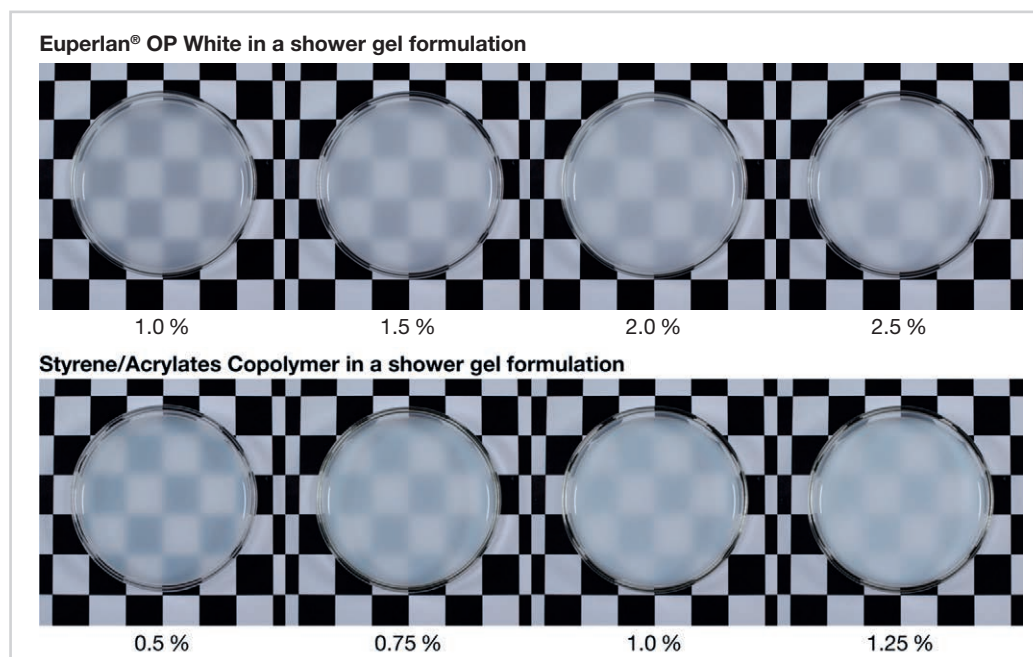
ious skin and hair rinse-off applications including shampoo, body wash, liquid soap and facial cleansing products. It is also mild enough to be used in baby cleansing formulations.

In 2021, Lamesoft® Balance was awarded first place in the “Functionals and Recipients” sub-category of “Cosmetics” for the BSB Innovation Prize, presented by the German consulting agency BSB [5].

## The performance and physical properties of Euperlan® OP White

Euperlan® OP White offers cosmetics manufacturers a new and sustainable opacifier dispersion that delivers outstanding pure white appearance without a bluish tinge. This is made possible by its special morphology of wax dispersion, which contains extra-fine wax particles with a characteristic particle size distribution. Its steric particle structures create a light-scattering effect, also known as an opacifying effect, which provides a well appreciated lotion-like white appearance for personal care rinse-off products.

The opacifying performance of Euperlan® OP White was tested in a benchmark study, where the new ingredient was compared against a market-leading benchmark opacifier based on synthetic polymers (Styrene/Acrylates Copolymer) in shower gel formulations at different concentrations. To achieve a comparable level of whiteness in finished formulations, it is recommended that Euperlan® OP White is used at a ratio of 2:1 to the benchmark opacifier. The opacifying effect can be easily adjusted for individual formulation concepts by cosmetic manufacturers (Figure 1).



**Fig. 1** Euperlan® OP White delivers the same superior white appearance in shower gel formulations when compared against a market-leading benchmark opacifier based on synthetic polymers (styrene/acrylates copolymer), and when used in a 2:1 ratio.

In addition to its excellent properties as an opacifier, tests have also shown that Euperlan® OP White provides benefits for hair care. Performance tests in simple shampoo formulations have clearly demonstrated that this new and sustainable opacifier significantly improves wet and dry combability as well as suppleness (smoothness and softness). This was particularly evident when Euperlan® OP White was used in formulations that included cationic guar (Dehyquart® Guar types, INCI: Guar Hydroxypropyltrimonium Chloride). When used in combination with the Dehyquart® Guar types N and HP, hair breakage was dramatically reduced to just 1 or 2%. This opens up possibilities for cosmetics manufacturers to use Euperlan® OP White in shampoo products with claims related to hair protection and strengthening (Figure 2).

Overall, these tests prove that Euperlan® OP White is able to offer the same high level of white appearance that is provided by typical opacifiers based on synthetic polymers. This readily biodegradable new opacifier dispersion for surfactant formulations also provides important benefits for hair care, including wet and dry combability, smoothness and softness. On top of this, it also offers attractive physical properties such as low viscosity, which makes it fluid and pumpable over a broad temperature range. Euperlan® OP White provides robust product stability, with no sedimentation or agglomeration over time and no need for intermediate filtering. It is self-dispersible and can be introduced in any step of the production process without pre-dispersion or a premix step. This reduces complexity in production, opening up opportunities for producers to meet shifting consumer demand and stay ahead of regulatory changes by switching to an eco-friendly opacifier.

### The performance and physical properties of Lamesoft® Balance

Lamesoft® Balance features a stabilizing mechanism that prevents the aggregation of small particles in formulations. This reduces the sedimentation speed of wax dispersions such as Euperlan® OP White in surfactant systems, which is

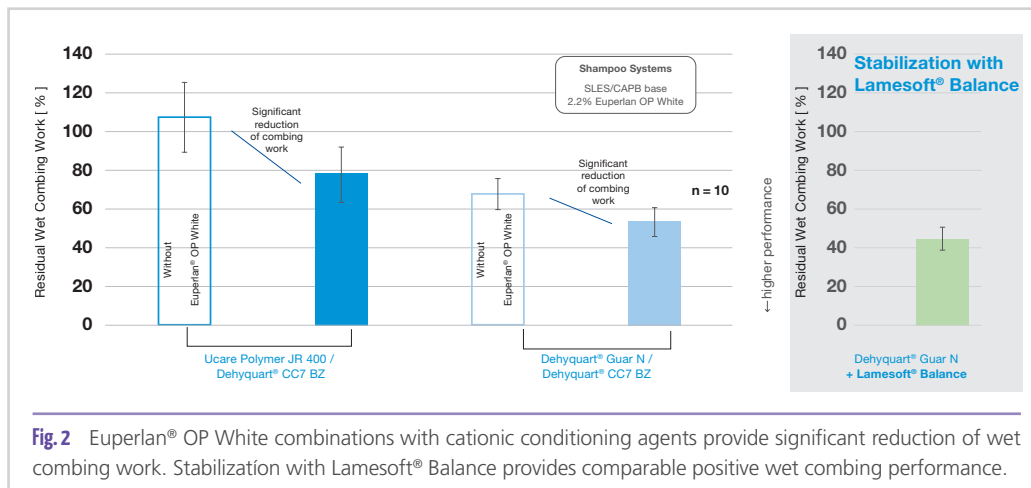


Fig. 2 Euperlan® OP White combinations with cationic conditioning agents provide significant reduction of wet combing work. Stabilization with Lamesoft® Balance provides comparable positive wet combing performance.

an important benefit for cosmetics manufacturers. Van-der-Waals forces lead to the fact that tiny particles agglomerate to bigger ones. With this in mind, dispersions will eventually separate to reduce the surface to volume ratio. These aggregations then build large particles that will sediment more rapidly and cause formulation instabilities.

Tests have shown that Lamesoft® Balance acts as a natural structurant in surfactant-based systems, especially those that can be micellar thickened. Different formulations containing the small-sized opacifying wax dispersion Euperlan® OP White at a concentration of 2.2% with a concentration of 1.5% Lamesoft® Balance and without the stabilization of this new ingredient were evaluated. Thin films of the formulation samples were heated on a heating plate and viewed under a microscope. The results of this test show that Lamesoft® Balance significantly reduces particle aggregation volume and speed. In this way, it extends the long-term stability of the formulation (Figure 3).

Further tests have also demonstrated that Lamesoft® Balance enhances sensory properties in body wash formulations. When compared to a placebo in various parameters, the new stabilizer boosted the foam properties and provided a pleasant skin feeling. In additional tests of shampoo formulations containing cationic conditioning agents, Lamesoft® Balance significantly boosted the hair-conditioning effect in terms of residual wet combing and dry combing. The new ingredient is suitable for use as a care additive in rinse-off formulations at higher usage levels between 3% and 5% (Figure 4 and 5).

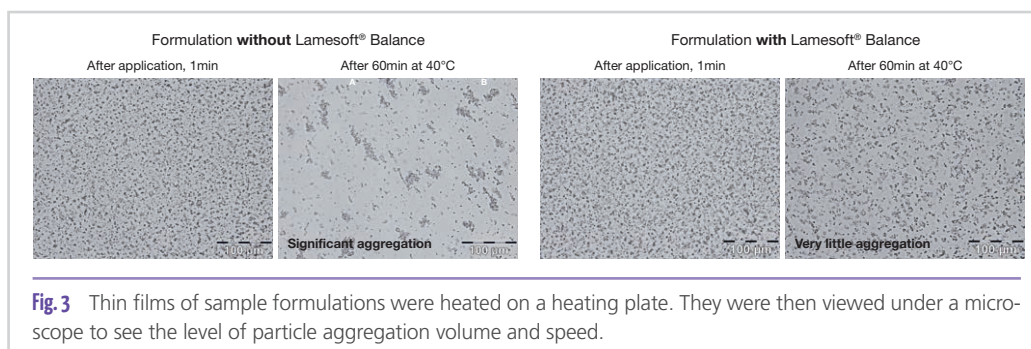


Fig. 3 Thin films of sample formulations were heated on a heating plate. They were then viewed under a microscope to see the level of particle aggregation volume and speed.

Overall, tests have shown that Lamesoft® Balance offers a stabilizing mechanism that reduces the sedimentation speed of wax dispersions in surfactant systems. It also enhances sensory properties in body wash formulations and improves the hair-conditioning effect in shampoo formulations containing cationic conditioning agents. In addition to this, it is cold processable and easy to formulate because it can be stirred into the surfactant solution before the addition of wax dispersion with no pre-dispersion. It even stabilizes low-viscosity formulations, and offers a pleasant and homogenous rheology of finished formulations. This makes Lamesoft® Balance an attractive option for cosmetics manufacturers who are seeking a 100% renewable-based stabilizer that makes it possible to offer products with sustainability claims – without compromising on performance.

## Conclusion

BASF has developed eco-friendly new ingredients that enable cosmetics manufacturers to respond to rising consumer demand for sustainable products that match or exceed the performance of traditional products. Euperlan® OP White is a readily biodegradable, wax-based opacifier that offers a sustainable alternative to synthetic opacifiers for surfactant formulations within hair and skin cleansing formulations. It is proven to offer the same high level of white appearance that is provided by opacifiers based on synthetic polymers. It also offers important benefits for hair care such as wet and dry combability, softness and smoothness. Lamesoft® Balance is a readily biodegradable and 100% natural ingredient that stabilizes wax-based dispersions such as Euperlan® OP White and enhances the sensory properties of rinse-off skin and hair cleansing formulations. Tests have demonstrated that it reduces the sedimentation speed of wax dispersions in surfactant systems, enhances sensory properties in body wash formulations and improves the hair conditioning effect when used in shampoo formulations containing cationic conditioning agents.

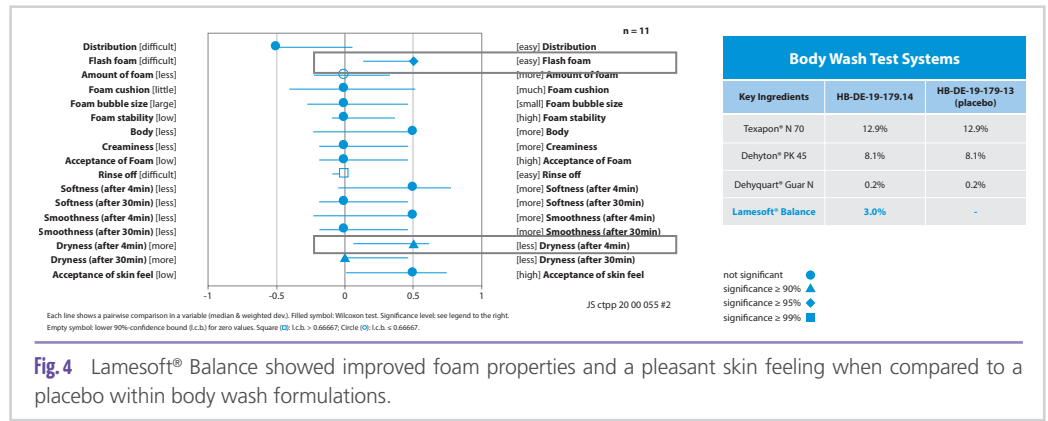


Fig. 4 Lamesoft® Balance showed improved foam properties and a pleasant skin feeling when compared to a placebo within body wash formulations.

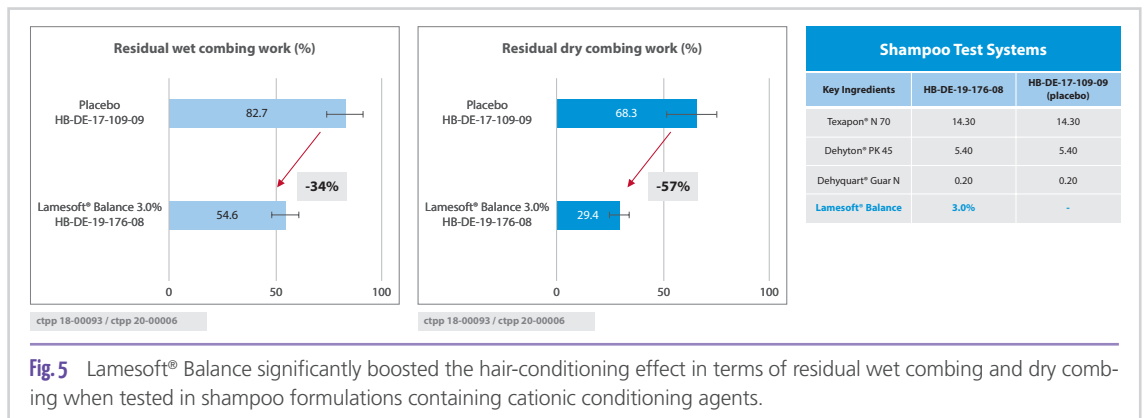


Fig. 5 Lamesoft® Balance significantly boosted the hair-conditioning effect in terms of residual wet combing and dry combing when tested in shampoo formulations containing cationic conditioning agents.

Especially when combined, these two innovations are powerful examples of how the latest sustainable technologies can allow manufacturers to meet consumer demand for eco-friendly cosmetics that deliver high performance – while also meeting regulatory and legislative definitions for being free of microplastic. As the trend for sustainability and conscious consumerism gather momentum, producers will need to adapt their formulations and stay ahead of the trend. Euperlan® OP White and Lamesoft® Balance can make that possible.

## References:

- [1] <https://echa.europa.eu/hot-topics/microplastics>
- [2] Mintel GNPD database: free-text search "new launches beauty and personal care Europe last 5 years microplastic"
- [3] <https://www.oecd.org/chemicalsafety/testing/5598432.pdf>
- [4] <https://www.basf.com/global/en/media/news-releases/2019/04/p-19-182.html>
- [5] <https://www.carecreations.basf.com/news-media/news-releases/news-detail/2021/4/23/three-first-places-basf-receives-bsb-innovation-awards-for-emollient-jockey-lamesoft-balance-and-peptide-4.0>

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# A Readily Biodegradable Alternative to Microplastic Opacifiers

F. Bussod, H. Kabir, C. Orizet, A. Sahouane, S. Zhou

## abstract

The personal and home care market is under continual development and raw material manufacturers need to develop new products to anticipate new consumer needs and regulation evolutions.

Hygiene and care products are an integral part of our daily lives, and unfortunately the same goes for plastics. It is present in large quantities in cosmetics and home care products, mostly in the form of synthetic polymers that are used for instance for exfoliation, opacification or rheology modification.

However, in recent years, the use of plastics and especially microplastics is at the heart of many controversies and debates due to their impact on the environment and health. It is required to find some alternatives.

In this context, Solvay has developed a naturally-derived biodegradable opacifying agent to replace the existing solution based on Styrene/Acrylates Copolymer.

## Introduction

More than 320 million tons of plastics are produced each year, of which 5 to 12 million tons are dumped into the seas and oceans with a proportion of microplastics hitherto unknown, but known to be considerable.

Recent measures have therefore been taken: the ban on the use of single-use plastics from 2021. And concerning microplastics, The European Chemicals Agency (ECHA) [1] announced at the end of January 2019 and updated in March 2019 a proposal for a restriction on the placing on the market or the use of microplastics intentionally added in products and in particular in cosmetics. Microplastics are defined as particles containing solid polymer, to which additives or other substances may have been added, and where  $\geq 1\%$  w/w of particles have all dimensions  $0.1\mu\text{m} \leq x \leq 5\text{mm}$ . The exemptions are for: natural polymers that have not been chemically modified, polymers that are biodegradable, polymers with a water solubility  $> 2\text{ g/L}$ .

According to this new regulation, Styrene/Acrylates copolymers, the most used opacifier in the Home and Personal Care market will be considered as a microplastics and banned by 2025.

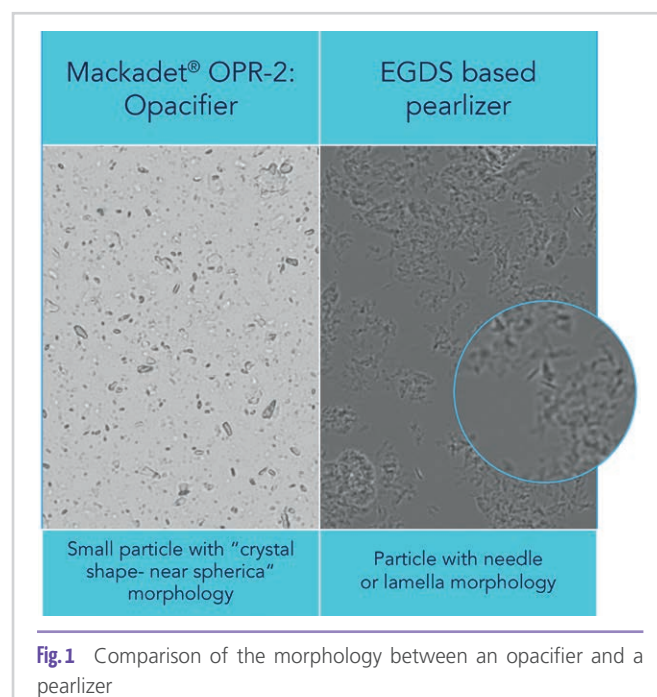
Some products such as exfoliating microbeads have already been banned since 2015 in several countries. It is necessary to find natural alternatives to plastic and direct research to favor new consumption patterns that are more respectful of the environment and more committed. In this context, Solvay has developed a non-microplastic readily biodegradable alternative opacifier: Mackadet® OPR-2.

## Materials & Methods

### Materials

#### Mackadet® OPR-2

Mackadet® OPR-2 is a patented opacifier concentrate with particles size from 1 to 10  $\mu\text{m}$  composed of water, glycol distearate, cocamidopropyl betaine and sodium benzoate as a preservative. All the components are readily biodegradable and Mackadet® OPR-2 does not contain any sulfated surfactants, so it is suitable for sulfate-free formulations. Thanks to the high refractive index of the Glycol Distearate ( $n=1.46$ )



versus the one of the continuous phase (water ; n=1.33), Mackadet® OPR-2 provides opacity.

The morphology of Mackadet® OPR-2 is different from a pearlescent agent. It has a very small particle size, with a near spherical morphology different from needles or lamellas reflecting the light. Thanks to its morphology & particle size distribution, Mackadet® OPR-2 is designed for optimum opacifying performance (Figure 1).

### Styrene/Acrylates Copolymer

A Styrene/Acrylates Copolymer was used as a comparative product, that has the advantage of having a high covering power for a small amount introduced in the formulation, as well as a good stability over time. This opacifier is a 100% synthetic polymer falling into the scope of the microplastics restriction. Furthermore, a premix of this product needs to be prepared before adding it into a formulation which is not convenient for the formulator.

### Formulations

The best way to evaluate an aesthetic agent is to evaluate it into a final formula (body wash,

shampoo or hand dish formulation). For the test in hand dish formulation, a commercial transparent Hand Dish Liquid (viscosity ~ 5000 cPs , @ 10 rpm, spindle 4) has been used and the opacifier has been added on top. For the cosmetic formulations, the opacifier is evaluated in a simplified cleansing formulation whose composition is detailed in Table 1.

All the formulations are realized in a plastic beaker where each ingredient is added. The mixture is stirred moderately by mechanical agitation. Stirring too fast can introduce air and create foam and bubbles in the preparation.

Ingredient	Dosage in active (%)
Anionic surfactant (Rhodapex® ESB 30HA1)	9-11.5%
Amphoteric surfactant (Mackam® 50ULB)	2.0%
Cationic polymer (jaguar® Excel)	0.3%
<b>Opacifying agent (Mackadet® OPR2)</b>	<b>0.7% to 1.8%</b>
Sodium chloride (viscosity modifier)	1.6%
Sodium benzoate/salicylic acid (preservative)	0.4% / 0.23%
Citric acid (pH adjuster)	Qsp
Water	Qsp-100

Table 1: Typical simplified personal care formula

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## Methods

### Raw material ageing test

To evaluate Mackadet® OPR-2 stability as a raw material, an accelerated temperature-ageing test using the following protocols has been carried out:

- The first test consists in storing Mackadet® OPR-2 in a ventilated oven at 4 degrees Celsius and 40 degrees Celsius during 3 months and in measuring the viscosity of the product each week using a brookfield DVII + RV viscometer at a rotation speed of 10 rpm. The appearance of the sample is also noted; its particle size distribution is characterized by using an Horiba granulometer and the particle shape is checked by using an optical microscope.
- The last test to characterize Mackadet® OPR2 stability is a freeze and thaw test. One cycle is composed by the following steps:
  - Decreasing the temperature from 25°C to -9°C in 8 hours
  - Plateau at -9° C during 8 hours
  - Increasing the temperature to reach 25°C during 8 hours
  - And then plateau at 25°C during 8 hours
 The test has five cycles and the same assessments as the ones described above for the tests at 4 and 40°C are carried out.

### Formulation ageing test

In order to simulate the evolution of the product over time in the final formulation (storage, transport, daily use), a stability study is carried out under different temperature conditions in an oven and in a climatic room: at 4°C, 45°C, room temperature for 6 months and 5 freeze cycles / thaw ranging from -9 to 25° C (Cycle F / T = Freeze / Thaw). Any abnormal aspect (macro and micro) or viscosity evolution of the formula compared to the initial state is noted, enabling to determine whether the formula is unstable or otherwise stable.

### Opacifying performance

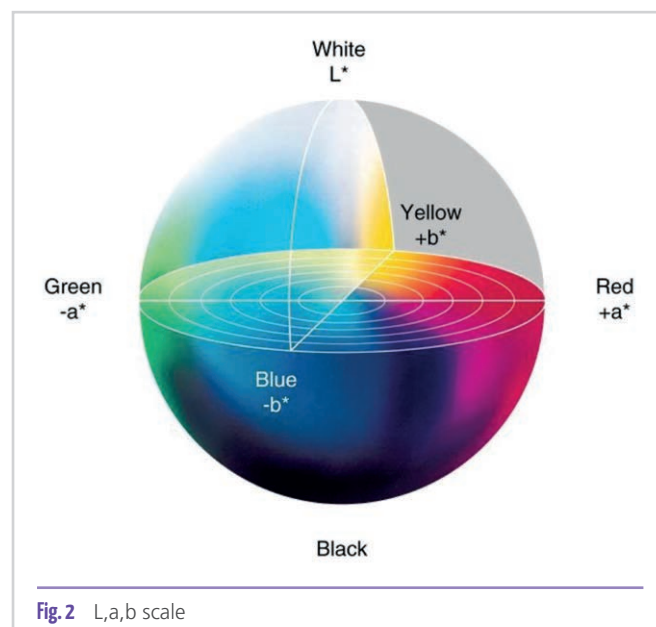
The perception of colors by the human-being is specific to each individual. The color of an object can be described in a different way depending on who will observe it. To overcome this problem and impartially qualify the color and its depth, there are various tools such as the colorimeter to analyze the color.

To assess the performances of our opacifier, a spectrophotometer DR LANGE LUCI 100 has been used.

First, the colorimetric coordinates of the sample (raw material or formulation) are measured in the color space L, a, b also called CIELAB (**Figure 2**).

The measurements are made on a black background, and then, on a white background.

In the case of the opacity measurement, the color coordinate L, corresponding to the whiteness of the sample, will be used. The higher the L, the more the observer perceives the sample as being white.

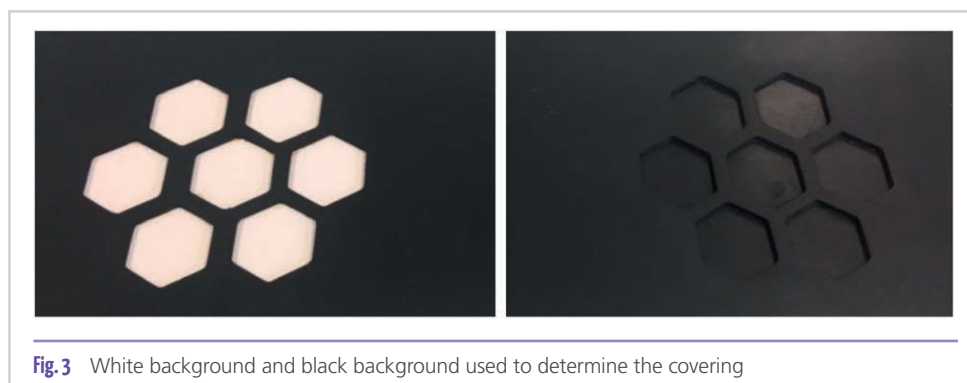


Mackadet® OPR-2 covering effect is defined by the ratio of the L coordinate measured on a black background versus the L coordinate measured on a white background; the result being expressed as a percentage. The plates used to measure covering effect consist of hexagonal shaped cells of 2 cm wide by 3 mm thick and the sample quantity for each measurement is 1.5 milliliter per cell, each sample is measured 3 times (**Figure 3**).

## Results

### Opacifying performance in a simplified Personal Care formula

To assess the opacifying performance of Mackadet® OPR-2, simplified personal care formulas are prepared and the mini-



mum level to add to get a white formulation is determined.

Incorporating Mackadet® OPR-2 into a personal care formula is quite easy. Indeed, it is a ready-to-use product that can be added at any step of the formulation. It offers ease-of-use and flexibility to the formulator: no premix required like for Styrene/Acrylates Copolymer and no need to homogenize before introducing it into the main batch, contrary to other natural-based opacifiers available on the market, likely because Mackadet® OPR-2 has a higher concentration of Glycol Distearate.

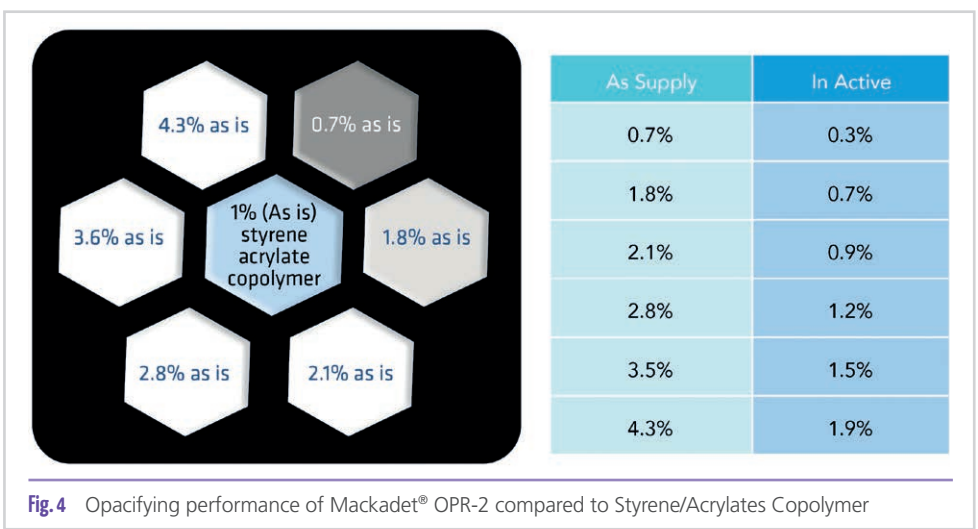
In the simplified shampoo formula used for the investigation, by a visual assessment, it comes out that the opacifying performance increases with the dosage of Mackadet® OPR-2. The opacity and the whiteness levels reached with 0.7% active of Mackadet® OPR-2 (i.e. 1.8% as supplied) are good, and, compared to the Styrene/Acrylates Copolymer, the formula with Mackadet® OPR-2 looks whiter (less blueish, see **Figure 4**) versus the one based on Styrene/Acrylates Copolymer.

The results of the visual assessments are confirmed by the quantitative method. The covering effect & the whiteness of the formula increase with the dosage of Mackadet® OPR-2 (**Figure 5 and Figure 6**) and at 0.7% active of Mackadet® OPR-2, the opacity and the whiteness levels of the formula with Mackadet® OPR-2 are higher than the ones of the formula incorporating a standard dosage of Styrene/Acrylates Copolymer.

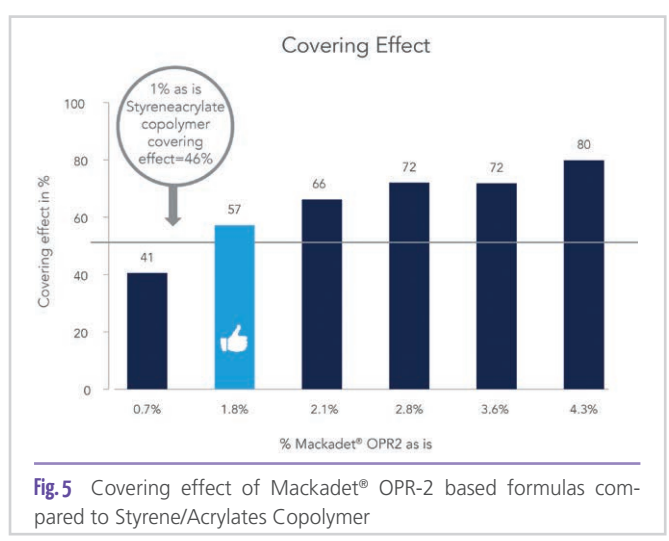
To go further in the understanding, pH level, cocamidopropyl betaine level and salt level have been explored to check the good compatibility of Mackadet® OPR-2 in those systems. As the results, Mackadet® OPR-2 is stable in high betaine and high salt formulations at all pH levels.

**In formulations containing dyes**

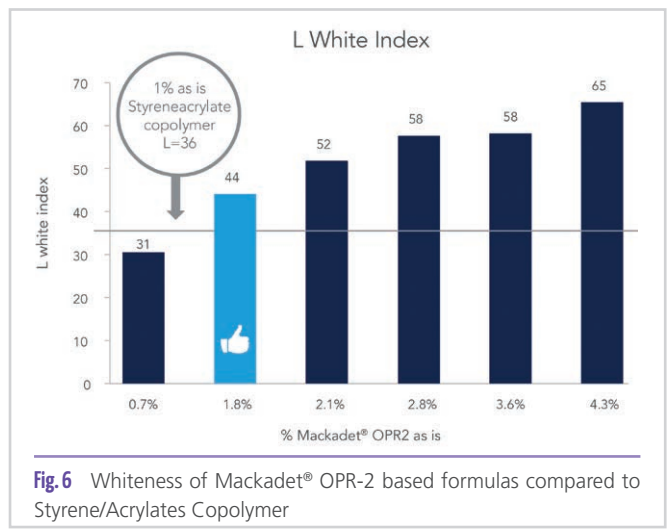
Another application of Mackadet® OPR-2 is its ability to bring out the color provided by a dye compared to a formulation containing Styrene/Acrylates Copolymer. Styrene/Acrylates Copolymer has good opacifying power but provides a blueish effect to formulations. This can therefore impact the final color when adding a colorant. Colored formulations containing Styrene/Acrylates Copolymer are more bland than with Mackadet® OPR-2. Mackadet® OPR-2 allows for whiter formulations and does not alter the color of the dye.



**Fig. 4** Opacifying performance of Mackadet® OPR-2 compared to Styrene/Acrylates Copolymer



**Fig. 5** Covering effect of Mackadet® OPR-2 based formulas compared to Styrene/Acrylates Copolymer



**Fig. 6** Whiteness of Mackadet® OPR-2 based formulas compared to Styrene/Acrylates Copolymer

Using the simplified personal care composition previously described, several shower gels with Mackadet® OPR-2 have been formulated, adding on top various dyes from Sensient Cosmetic Technologies: Unicert Violet K7025-J, Unicert Red K7057-J, Unicert Red 07004-J, Sensient Mint Green E C0597 from Sensient. Photos of these formulas versus the exact same formulas based on Styrene/Acrylates Copolymer are displayed on **Figure 7**.

The colors of the formulas based on Mackadet® OPR-2 are more intense thanks to the covering power and the initial whiteness delivered by this opacifier.

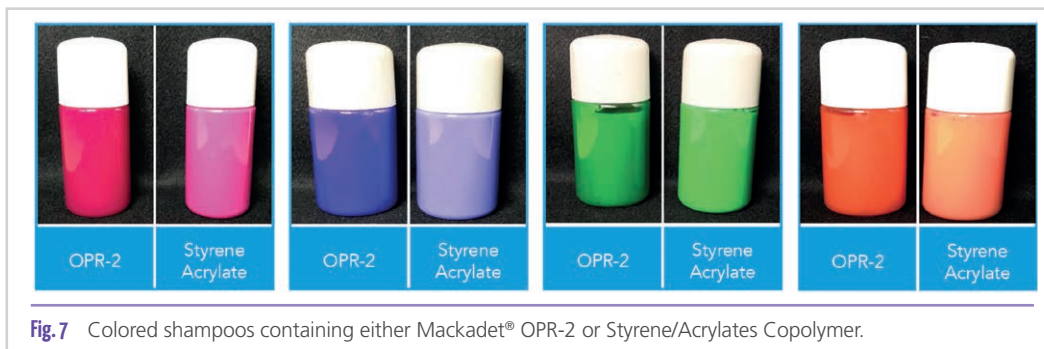


Fig.7 Colored shampoos containing either Mackadet® OPR-2 or Styrene/Acrylates Copolymer.

### Opacifying performance in Hand Dish application

The use of Mackadet® OPR-2 can be extended to Home Care applications. To make a white and opaque liquid detergent, Mackadet® OPR-2 is added to a commercial transparent hand dish liquid. The opacifying performance has been assessed visually (see Figure 8).

### Stability results

The stability of the raw material has been assessed using the method described in the section before. Mackadet® OPR-2 successfully passes the stability testing. Shelf life has been set at 2 years.

The stability of several formulas incorporating Mackadet® OPR-2 (shower gels, shampoos, hand dish liquid) has also been checked. The formulas are stable over time at the different tested temperatures.

### Limitations & Solutions

In Home Care applications, 2 challenges are usually faced. First, the viscosity of the final formulas is often too low to suspend Mackadet® OPR-2. As a consequence, a phase separation can be observed. Second, the presence of propylene glycol, that is often used in liquid laundry or capsule, is not compatible with Mackadet® OPR-2: the propylene glycol dissolves the Glycol Distearate, hence decreasing the opacifying performance.

For low viscosities formulas for which a phase separation is observed, the issue can be solved with the use of a rheological agent. However, the constraint in those applications is to not increase the final viscosity of the detergent. Solvay has in its portfolio a new natural rheological agent, Rheozan® BLC, derived from a biotechnology fermentation process, that delivers high suspension power without impacting the

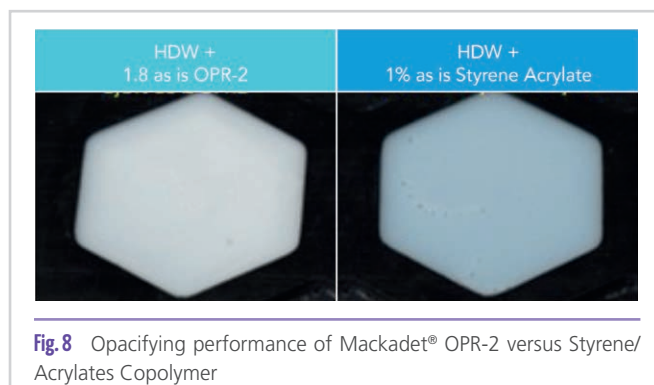


Fig.8 Opacifying performance of Mackadet® OPR-2 versus Styrene/Acrylates Copolymer

viscosity of the formulation. To stabilize 1% active of Mackadet® OPR-2 in a liquid detergent having a viscosity lower than 3000 cP, it is recommended to add 0.05% active of Rheozan® BLC. Figure 9 shows that the liquid detergent is stable in presence of Rheozan® BLC.

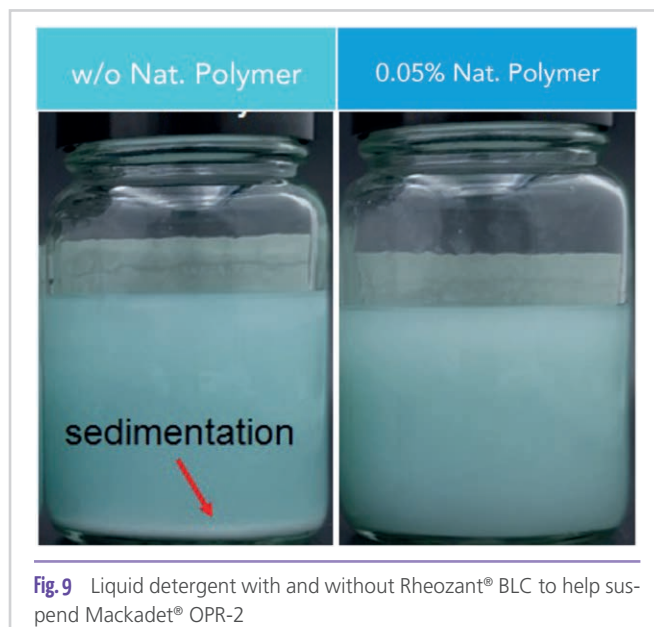


Fig.9 Liquid detergent with and without Rheozan® BLC to help suspend Mackadet® OPR-2

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Regarding the loss of the opacifying performance in presence of propylene glycol, developments are still on-going to find a suitable solution.

## Conclusion

Mackadet® OPR-2 is a powerful alternative to microplastic opacifiers like Styrene/Acrylates Copolymer. It has a high natural content (natural origin index, INO = 0.91 according to ISO 16128 standard) and all its components are readily biodegradable. Mackadet® OPR-2 is suitable for sulfate and sulfate-free formulations. In terms of application properties, formulations based on Mackadet® OPR-2 have an equivalent or even better opacifying performance than those made with Styrene/Acrylates Copolymer and they also have more intense colors when they incorporate dyes. Mackadet® OPR-2 is also very easy to use: no premix is needed and it can be added at any step of the process. Besides, Mackadet® OPR-2 is not sensitive to the level of surfactants in the formulation, unlike Styrene/Acrylates Copolymer.

Mackadet® OPR-2 stability & performance in formulas is sensitive to the final viscosity of the manufactured product and to the presence of Propylene Glycol. In the case of low viscosity formulas (viscosity below 5000 cps), adding Rheozan® BLC enables to solve the destabilization issue. For the compatibility issue with propylene glycol, no proper solution has been found so far. Investigations are ongoing to find out a solution.

## References:

[1] <https://echa.europa.eu/> - ECHA Europeans Chemical Agency - Microplastics

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# Cleaning More, for Less – a Sustainable Liquid Laundry Concentrate

C. Sturm, F. Jaeglé

## abstract

In this article we will look at how the industry can respond to consumer trends [1] for more sustainable laundry solutions, a reduction in plastic packaging and a longer-term approach to the world's water scarcity issues.

## Introduction

The continued decline in powder laundry detergent consumption across Europe has corresponded to a growth in liquid capsules whilst at the same time the demand for liquid laundry has remained flat (Figure 1).

We asked ourselves, are liquid capsules the industry's best response to consumer needs? Aside from being the most convenient form of delivery, liquid capsules present limitations for both producer and consumer.

From a production perspective, the manufacture of liquid capsules is linked to high formulation and processing constraints. Formulators need to overcome issues relating to the integrity of the formulation and the potentially detrimental impacts on the PVOH film which could affect the functionality of the capsules over long periods of time. For example, leaching of fragrances, plasticizing of the film, or stringing of the formulation during the filling process.

In addition, the upfront investment required in suitable equipment for the production of liquid capsules will, in many cases prove prohibitive, meaning toll manufacturers may prove to be the only option.

From the consumers perspective, whilst the use of liquid capsules provide convenience, they severely restrict the ability to adapt wash dosage to reflect changing washing conditions, such as water hardness, size of load or soiling of the fabrics.

Additionally, and despite the mandatory inclusion of a bittering agent within the PVOH film, the appearance of liquid laundry capsules makes them very

attractive to small children with the obvious danger related to ingestion [2].

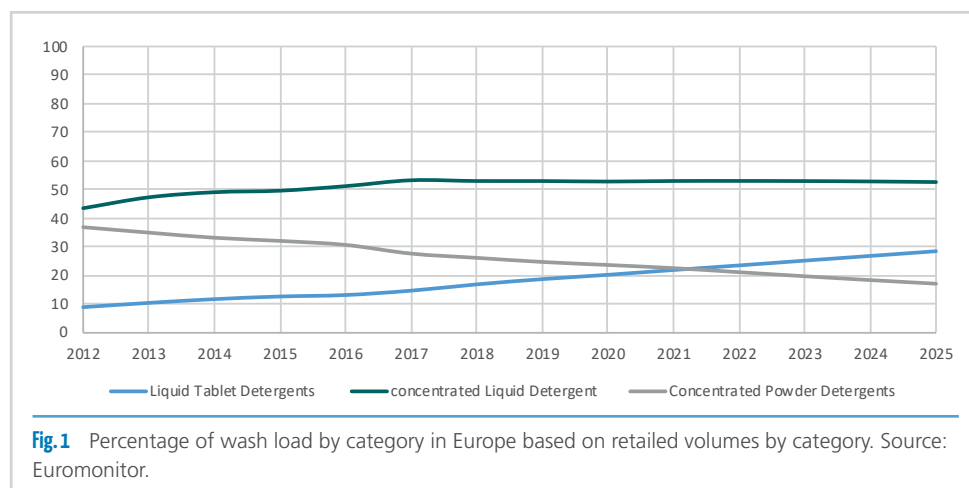
## Our approach

When looking at the consumer and sustainability demands, and the steadily declining use of powdered laundry detergent, it appeared that the best alternative was to develop a new liquid laundry concentrate. This would bring more convenience to the market than traditional powdered detergent, would require less packing and would eliminate the complicated requirements of encapsulating a liquid in PVOH film.

Following the 2019 call to action from the A.I.S.E. (International Association for Soaps,

Detergents and Maintenance Products) to concentrate liquid laundry formulation to 50-55 mL we introduced a 50 mL liquid concentrate to our customers.

Two-years later, witnessing the ongoing pressure to deliver more sustainable laundry solutions, we took our 50 ml formulation as a starting point to develop a 25 mL liquid concentrate.





At the start of our research, we set out two key objectives:

- Achieving comparable cleaning performance to liquid capsules from a European leading brand
- Maintaining the physical stability over four weeks at 5°C, room temperature and 37°C \*

In theory, the simplest way of proceeding would be to double the active matter. However, in practice, this is not possible due to the formation of a gel phase which results from the surfactants involved.

To achieve the best performing formulation, while increasing the sustainability profile of our ingredients, we divided our formulation into four clusters investigating the interaction between them:

- Surfactants
- Solubilizers
- Chelating agents
- Enzymes

## Cleaning performance of various surfactants

### Procedure

We used the following test design (protocol):

- Cotton short cycle with a duration of 1:49h on Miele W 1935 washing machines
- Washing temperature of 40°C
- Water hardness of 16 °GH (285 ppm CaCO<sub>3</sub>)
- Base load of 3,5kg
- Addition of 2 SBL 2004 as soil ballast
- Detergent was dosed with 100ml at 10% active matter – dilution in 100ml to avoid gel formation, corresponding to 40% a.m. in 25ml
- Three cycles

The tests stains can be found in **Table 1**. We deliberately included different fabrics to see if this had any influence on the performance. The results are expressed in average of the soil removal on the swatches by category in %. Soil removal was measured using Minolta CM 3600 A Spectrometer.

Fabric	Stain Type	Protease	Detergency
CFT C-10	pigment & oil & milk CO	X	
EMPA 117	blood & milk & ink PE/CO	X	
CFT C-S-32	sebum & carbon black CO		X
WFK 10 LS	Lipstick CO		X
CFT P-S-61	beef fat, coloured PE		X
CFT PC-S-62	lard, coloured PE/CO		X
EMPA 101	olive oil Soot on PE/CO		X

**Tab.1** Test stains

### Explanation of the calculation:

- Soil release in % = (soil removal / initial soil value) \* 100
- initial soil value = ΔE pre-value and unsoiled cotton
- soil removal = ΔE pre and post washing value

The two base formulations used to perform the trials can be found in **Table 2**.

	Base 1 (a.m %)	Base 2 (a.m %)
Water	Add to 100	Add to 100
Sodium citrate	1	1
Potassium cocoate	0,9	0,9
GLDA	0,6	
DTPMP		0,3
Preferenz® P300 (protease)	0,5	0,5
Surfactant	10	10

**Tab.2** Formulation bases

\* Convention would suggest 40°C but such a temperature would destroy the performance of enzymes

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## Results

The detergency performance achieved with the different non-ionic surfactants tested is not influenced by the use of GLDA or DTPMP as chelating agent (Figure 2, Figure 3), the detergency results with anionic surfactants are slightly better with DTPMP.

Looking at the performance on proteinic stains, from the non-ionic surfactants only Trideceth 7 is showing less performance with GLDA, whereas there is almost no influence on the anionic surfactants with Sodium Lauryl Sulphate being the best choice (Figure 2, Figure 3).

In theory, particulate soils on cotton are better removed by anionics while non-ionic should be better for manmade fibres. However, these results were not reflected in our testing. The differences in performance observed are clearly linked to the soiling itself and not to the fabric (Figure 4).

We were quite surprised by the results with different soaps, used usually as anti-foam in classical formulation we were expecting some soil removal performance while tested at 10% active matter. The results show almost no performance, independent from the chelating agent.

## Obstacles and solutions

In the formulation of a 25ml concentrate, we faced two main obstacles – crystallisation and gel formation.

The progress towards further compaction tended to increase crystallization from the FAEO at 5°C.

In order to reduce crystallisation, we partially sub-

stituted the FAEO with APG and as a result made the formulation more sustainable. However, even this partial substitution did not solve the problem and nor did the addition of ethanol, isopropanol or different other additives we tried. The addition of propylene glycol to overcome the crystallisation inadvertently resulted in the formation of a non-reversible gel, over time at 5°C.

Options for overcoming the issues of crystallisation and gel formation were:

- Optimising the levels of both propylene glycol (Formulation 56, 25 and 61), and hydrotrope (either - cumene sulfonate - Formulation 56, 61 - or sodium oleylsulfate - Formulation 25).

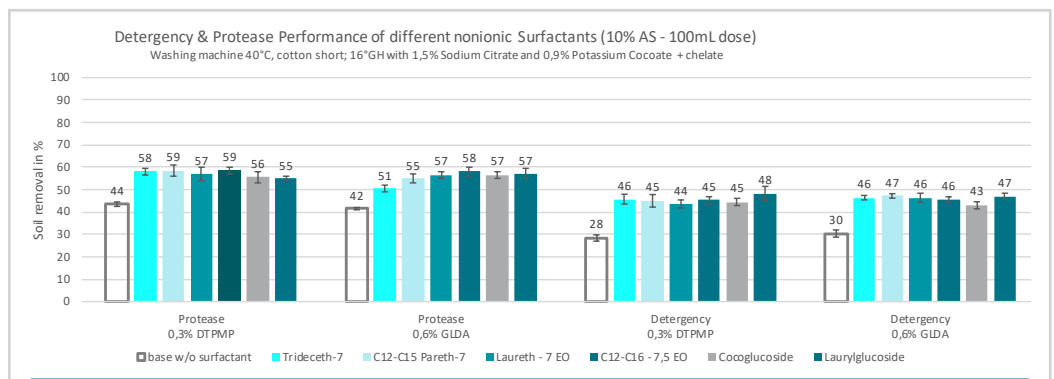


Fig.2 Influence of GLDA and DTPMP on the protease performance and the detergency as a function of the non ionic surfactant

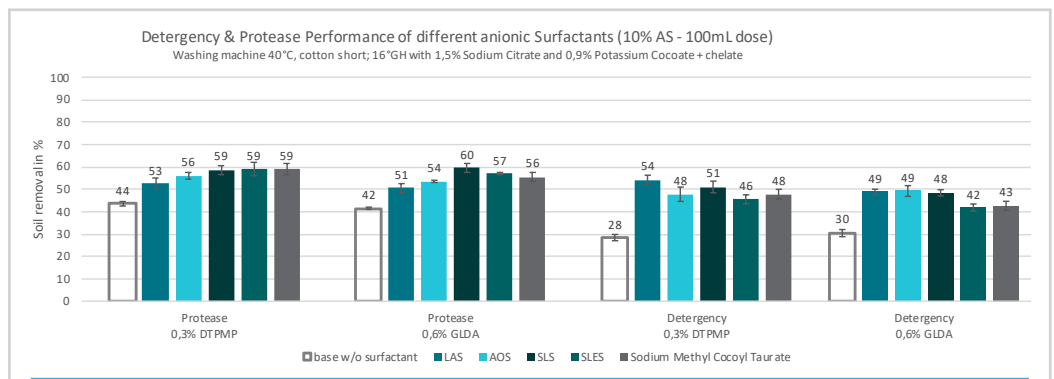


Fig.3 Influence of GLDA and DTPMP on the protease performance and the detergency as a function of the anionic surfactant

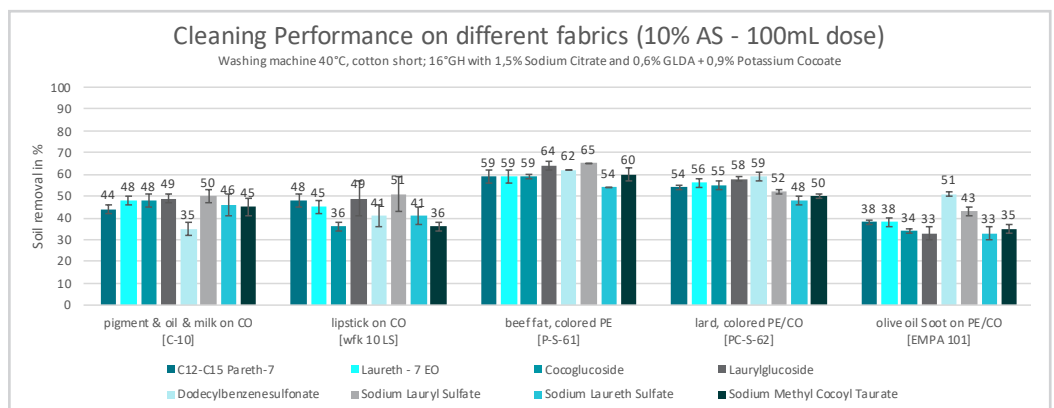


Fig.4 Influence of cleaning performance on different fabrics (sebum & BMI excluded as they showed no differences).

- Complete removal of the FAEO from the formulation (Formulation 62, 66).

By reducing the level of FAEO, sustainability of the overall formulation increased.

While introducing ingredients with an improved sustainability profile like Tall Oil Fatty Acid (TOFA), Alkyl Polyglucoside (APG) or Sodium Methyl Cocoyl Taurate, we realised not all of them are suitable for super concentrates.

Although Sodium Methyl Cocoyl Taurate is a good choice for up to 50 mL liquid concentrate, when it comes to 25 mL the formulation either crystallises or goes solid. TOFA, not to be confused with any tallow derivate, may not be a well-known ingredient but is a biobased fatty acid produced from the refining of crude pine oil.

During the complete formulation development process, we were mindful to ensure that the environment was friendly enough to the enzymes. For this reason and to improve the sustainability we built our system on SLES as the main surfactant instead of ABS or LAS.

We ended up with three main families of formulation that we entitled 'Economical' (Formulation 56), 'Eco-balanced' (Formulation 25, 61, 62) and 'Ecological' (Formulation 66). In this article we are discussing five examples.

### From economical to ecological, a proposal for 25 mL liquid laundry concentrates

All formulations presented are stable from 5°C to 37°C. But physical stability is only the beginning of the development process. The cleaning performance had to match our expectations.

Fabric	Stain Type	Protease	Amylase	Mannanase	Lipase	Detergency	Bleach
CFT C-10	pigment & oil & milk CO	X					
EMPA 117	blood & milk & ink PE/CO	X					
CFT C-S-85	sheep blood CO	X					
CFT C-S-38	egg yolk + pigment, aged CO	X					
EMPA 161	Starch CO		X				
CFT C-S-26	corn starch CO		X				
CFT C-S-27	potato starch CO		X				
CFT C-S-73	locust bean gum & pigment CO			X			
EMPA 165	chocolate pudding CO			X			
CFT PC-S-73	locust bean gum & pigment PE/CO			X			
WFK 10 LS	Lipstick CO				X	X	
CFT C-S-46B	frying fat used CO				X	X	
CFT C-01	mineral oil & carbon black CO					X	
CFT KC-H-026	red wine KCO						X

Tab.3 Test stains

Phase	Ingredients	18-026-4 50 mL a.m%	21-010-56 Economical a.m %	21-010-25 Eco-balanced a.m %	21-010-61 Eco-balanced a.m %	21-010-62 Eco-balanced a.m %	21-010-66 Ecological a.m %
	Total Soil removal score aged (vs. Benchmark 765)	798	800	831	825	799	760
	Total active matter	32	39,2	40,7	39,4	39,2	40
A	Water demin	43,55	13,12	6,12	12,62	11,12	8,62
	Dipropylene Glycol	1,5	10	8	10	5	8
	Mono-Ethanolamine			5	4	4	7
	Citric Acid		5	4	4	5	3,5
	Sodium Citrate	3					
B	Potassium Cocoate	2	3,5		4,2	4,2	
	Tall Oil Fatty Acid			5			15
	DTPMP	1	1,3				
	GLDA			2,4	2,4	2,4	2,4
C	LAS	5	6	6			
	SLS				5,5	5,5	
	SLES	15	17,5	17,5	17,5	17,5	
	FAEO C12-15 Pareth-7	10	7,2	7,2	7,2		
	Cocoglucoside			5		12	25
	Laurylglucoside				5		
	Cumene sulfonate		0,4		0,2		
Sodium Caprylyl Sulfat			4				
D	Preferenz® P300 - protease	0,5	1	1	1	1	1
	Preferenz® S210 - amylase	0,3	0,5	0,5	0,5	0,5	0,5
	Preferenz® M100 - mannanase	0,1	0,3	0,3	0,3	0,3	0,3
	Revitalenz® 200 - cellulase	0,03	0,08	0,08	0,08	0,08	0,08

Tab.4 Proposed formulations

We used the following test protocol:

- Cotton short cycle with a duration of 1:49h on Miele W 1935 washing machines
- Washing temperature of 40°C
- Water hardness of 16 °GH (285 ppm CaCO3)
- Base load of 3,5kg
- Addition of 2 SBL 2004 as soil ballast
- Detergent was dosed with 100ml at 10% active matter – dilution in 100ml to avoid gel formation, corresponding to 40% a.m. in 25ml
- Three cycles
- Performance was tested fresh and after aging four weeks at 37°C.

The tests stains can be found in **Table 3**.

The soil removal performance is measured with a spectrometer (Minolta CM 3600 A Spectrometer) comparing initial L.a.b. value with the value after wash.

The results are expressed in average of the soil removal on the swatches by category in %.

The process procedure for the formulations is add ingredients from phase A to the water, followed by the ingredients from the phase B, C and D under agitation with an IKA stirrer. The pH is adjusted to 8,5.

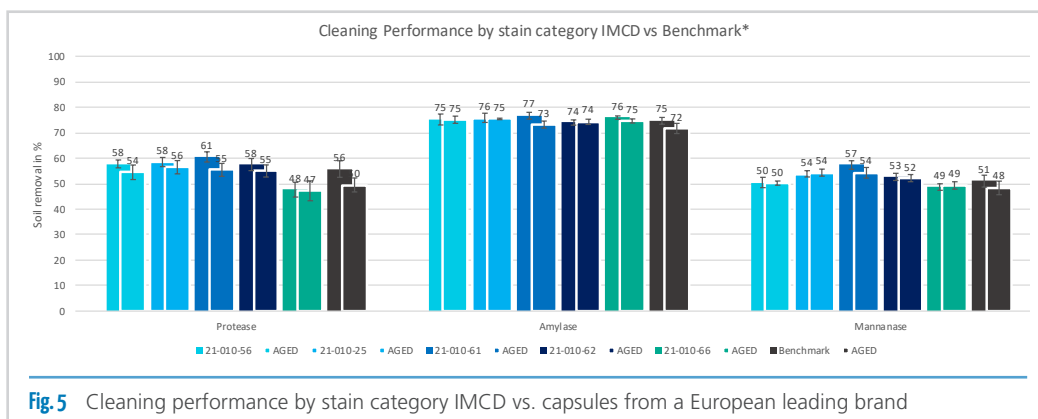


Fig. 5 Cleaning performance by stain category IMCD vs. capsules from a European leading brand

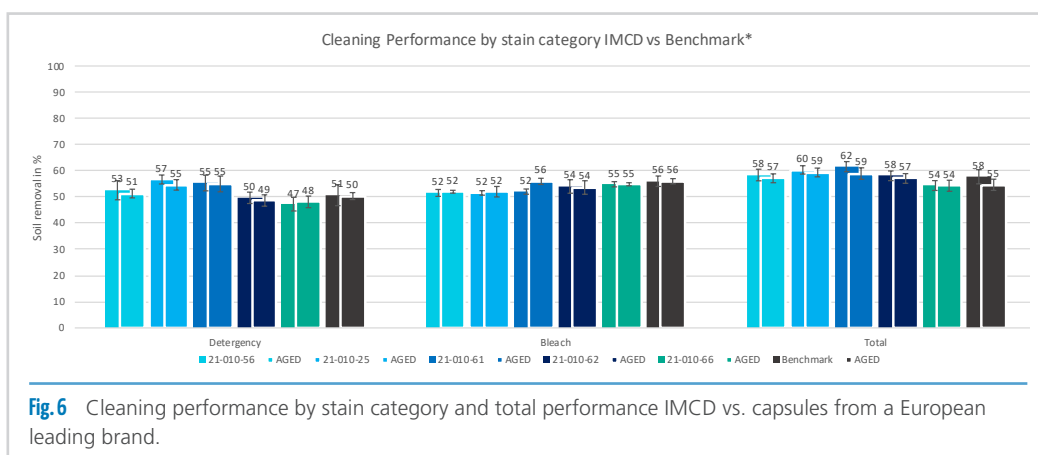


Fig. 6 Cleaning performance by stain category and total performance IMCD vs. capsules from a European leading brand.

## Conclusion

Aside from the 'Ecological' formulation 21-10-66 the remaining formulations all match or exceed the performance of the benchmark in the various performance categories tested (Figures 5 and 6). We are still investigating how to improve the ecological formulation.

In conclusion, we can say that it is possible to formulate concentrated formulations dosed at 25 mL, stable four weeks at 5°C and 37°C, which dissolve in water within a few seconds and are presenting a cleaning performance profile comparable with leading European branded capsules.

The choice of the ingredients will determine the level of sustainability and cost of the formulation.

There are several possibilities to improve the sustainability, such as removing LAS, reducing / removing the FAEO, adjusting / removing propylene glycol, substituting phosphonate with GLDA or an alternative natural based chelating agent.

In order to meet our aspirations for full ecological, optimal performing formulation additional improvements are required.

This will take into account existing products such as glycerine and natural propanediol and future product developments in partnership with our suppliers.

While we have successfully developed a liquid laundry concentrate, which has met our key objectives and in turn reduced the amount of water required in manufacture by up to 95%, the success of these concentrates will remain the responsibility of manufacturers to develop appropriate packaging to enable a flexible and convenient dosage by the end-user

## References:

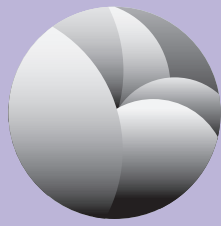
- [1] <https://www.imcdgroup.com/en/business-groups/home-care-and-i-and-i/Trend-Commentary>
- [2]. <https://www.oecd.org/sti/consumer/Laundry-Detergent-Awareness.htm>

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**VINCENZ**



# Concentrated Expertise for Sustainable Products and Processes

## Interview with Fraunhofer Institute for Process Engineering and Packaging IVV

### *What does the Fraunhofer Institute for Process Engineering and Packaging IVV do?*

**Andrea Büttner:** We play a leading role in applied research for the secure supply of high-quality food and for sustainable packaging systems. Climate change and increasingly scarce resources and cultivation areas, along with a growing world population, are major challenges that demand new, sustainable value creation. This is what our approximately 300 researchers are working on. They develop pioneering products, processes and technologies in the fields of food, packaging, product effects and processing machinery, as well as recycling and the environment. Shaping the future together and driving the transformation towards a resilient and sustainable food and packaging industry – that is what inspires us in our day-to-day research work. We also find it motivating when we can apply our know-how in other industries as well.

### *Like the cosmetics industry?*

**Andrea Büttner:** Yes, because consumer demand for safe and sustainable products is growing rapidly here. One of the reasons for this is that sustainability is often associated with high value. This in turn gives consumers a feeling of well-being and has a positive effect on their health. These two points, along with bio-economy, circular economy, resilience and security, are some of our strategic subject areas. Here, we strategically apply our expertise and experience from more than 50 years of packaging and food science to develop bio-based and recyclable products, as well as resource-conserving processes – for the cosmetics industry as well.

### *... what does that mean in concrete terms?*

**Andrea Büttner:** The cosmetics industry is relying more and more on natural materials and recycled packaging. However, sustainability is more than that. It plays an important role not only in perception, but also in technological processes such as cleaning and hygiene. Our team, which is made up of different disciplines, has the right knowledge and experts with complementary expertise to organize sustainable product de-

velopment along the entire process chain: from raw materials to the mechanical processes to the packaged product.

### *What does the aspect of well-being mean in the context of sustainability and why is it so important for consumers today?*

**Jessica Freiherr:** We are constantly reminded by e.g. natural disasters, that every one of us has to do something for the preservation of our environment. When it comes to buying sustainably produced products, consumers hope for a certain connection to nature and to avoid ingredients and processing methods that are synthetic and potentially harmful to the environment and their health. Using sustainable products makes people feel good about themselves and also potentially willing to accept a higher price. One challenge for companies is to find out which raw materials, products or processes are particularly sustainable or are perceived to be sustainable by consumers and therefore of high quality. Based on this knowledge, companies can change their production.

### *What can companies do to produce more sustainable cosmetic products?*

**André Boye:** The aspect of sustainability is very complex and covers many areas that are often not apparent at first glance. Even cleaning the production facilities is a resource-intensive process step with regard to water and energy consumption, since the existing systems are rigid and the processes are designed for the worst case. One solution is to use adaptive cleaning systems, which adapt to the cleaning task, that is, the geometry of the equipment and the degree of contamination – reducing cleaning times by half is realistic. The use of our contamination sensor technology for tanks for example, tells me when my tank is clean and the cleaning process can be stopped. Process optimizations in the area of cleaning not only help the environment, but also deliver significant savings for manufacturers – a win-win situation.

### *In recent years, we have seen that many manufacturers are increasingly focusing on natural cosmetics. What challenges do companies that want to produce sustainable cosmetics face?*

**Arielle Springer:** The term “natural cosmetics” is not uniformly defined. Depending on the certified natural cosmetics label under which the product is to be marketed, many ingredients that improve shelf life in conventional cosmetics may not be permitted. At the same time, sustainable packaging is required, but often does not offer the same level of product protection yet. Water and CO<sub>2</sub> need to be reduced in the production of raw materials and products, as well as in shipping.

Technical additives for cleaning and sterilizing equipment are limited. All these factors can have a negative impact on product quality.

**What solutions are there to guarantee product quality in spite of this?**

**Arielle Springer:** The interaction of bulk, process control, packaging and storage is important. At Fraunhofer IVV, we deal with a wide range of research topics: from the optimization of plastics and the use of new cosmetic ingredients to the investigation of product quality and shelf life and much more.

**Cornelia Stramm:** To find the optimum packaging concept for a product, we develop tailor-made packaging that can be based on biopolymers, among other things. We take shipping and storage conditions into account, as well as special requirements of the packaging material, such as recyclability in accordance with Germany's new Packaging Law. With regard to improving packaging quality, the characterization and evaluation of packaging materials play a decisive role, as do material tests, migration tests and sensory tests, for example.

**Arielle Springer:** These tests allow us to check product safety and find out what quantity of undesirable substances is transferred from the packaging to the product and their amount that can be absorbed dermally in the worst-case scenario. In this way, packaging materials can be optimized in terms of post-consumer recycle content.

**Marek Hauptmann:** In addition, packaging materials are investigated in various packaging processes, as well as in machine environment, to ensure that the packaging can be manufactured at all and to characterize the properties in the production environment such as reliability, availability and output, as well as to embed safe processes in quality management. This overall performance from different competencies at our institute is unique. We live this transdisciplinary approach every day and combine all the required solution competencies under one roof.

**And what about the product content itself: How can it be optimized?**

**Arielle Springer:** To protect a cream and extend its shelf life, for example, we can utilize the antioxidant effect of plant-based raw materials. If the packaging is permeable to oxygen, then fatty acids and other sensitive ingredients can oxidize, which causes them to lose their efficacy or develop a rancid odor. If the products are stored in light and heat, these reactions happen even faster. We use specially designed measuring cells with oxygen sensors to investigate the oxidation



**Dipl.-Leb.Chem.  
Arielle Springer**

is business development manager in the field of packaging at the Fraunhofer IVV. She studied food chemistry at the TU Dresden and gained professional experience as a product developer for a cosmetics manufacturer. Together with experienced experts, she works on an interdisciplinary basis to continuously improve the research field of Personal & Home Care.

**Prof. Dr. Andrea Büttner**  
Executive Director of Institute

**André Boye**  
Head of Department for Cyber-Physical Processing and Cleaning Systems

**Prof. Dr. Jessica Freiherr**  
Sensory Analytics

**Dr. Cornelia Stramm**  
Head of Department Materials Development

**Sandra Kiese**  
Group leader Process Development for Plant Raw Materials

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Head of Department Packaging and Processing Technologies

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stability of cosmetic products. In this process, we have gained many interesting insights into how different types of emulsions, oils, preservatives and plant extracts affect shelf life and the formation of rancid oxidation products. The targeted use of antioxidants from plant residues can compensate for more permeable packaging and maintain product quality.

**Sandra Kiese:** In addition, the use of residual materials from food production and the agricultural industry presents a great opportunity on our way to more sustainability. Residual materials often contain high concentrations of valuable ingredients, such as secondary plant substances. To obtain these substances from the auxiliary flows of processing and production, we are developing efficient, sustainable extraction methods. First of all, this enables us to reduce the waste of valuable residual material flows and thus contribute to environmental protection and resource efficiency. Secondly, it succeeds in developing new and simultaneously sustainable ingredients for cosmetic applications through recyclability and processing. The advantages lie in the multifunctional effects, such as anti-oxidative, anti-microbial or anti-aging.

**So the ingredients can also be marketed on the packaging. Does that increase consumer acceptance?**

**Jessica Freiherr:** Especially with new product concepts, consumer acceptance is crucial. The focus is on the consumer at every point in the development of a new cosmetic product or ingredient. We support the complete product development

line with insights into sensory perception, as well as product acceptance.

**Does that mean even the idea of a new development, such as using by-products from coffee production for cosmetics, is tested for consumer acceptance?**

**Jessica Freiherr:** Yes, exactly. As soon as new product concepts are developed, the sensory perception of the individual variants is reviewed and the product is sensorially optimized in a step by step manner. To objectively examine the perception of the product, we have numerous analytical methods at our disposal. For example, off-flavors are identified and measures are implemented to avoid them. At the end of the product development cycle, the acceptance of the finished product can then be tested in consumer trials, with regard to the packaging and any labels. This approach enables us to support companies in converting sustainable product concepts to market-ready products.



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December 2, 2021

## The virtual PERSONAL CARE eVENT

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## SkinNEWvation - the virtual SOFW eEVENT! The Facts

With over 800 registrations, the SKIN eVENT on September 9, 2021 was the most successful of the new SOFW eEVENT series so far.



Picture Credits: Lubis/Shutterstock.com

Under the name **"SkinNEWvation"**, important questions and new research results concerning our **skin** were answered.

How do active ingredients penetrate the skin? How can we measure this? What are the best carriers? How can formulators use this knowledge for cosmetic efficacy? And, of course, a few more.

**8 hours of concentrated knowledge** and new research results about our largest organ, **the skin**. The following presentations were given:

### Keynote lectures

**Prof. Dr. Dr. Jürgen Lademann, Charité: "The hair follicle as a major penetration route for topically applied active ingredients"**

Recently, it could be demonstrated that hair follicle delivery clearly depends on the activity status, size and density of the hair follicles. Especially nanoparticles have been shown to be effective drug carriers deep into the hair follicles.

**Prof. Dr. Cornelia Keck, University Marburg: "How does an active ingredient progress from the cream into the skin? A keynote lecture on the new understanding of the mechanisms of dermal active ingredient penetration."**

New pathways for dermal drug delivery were recently discovered. Most relevant findings include that dermal penetration occurs in three steps. In the first step, active compounds enter the skin via a solvent drag mechanism. The second step is passive diffusion and the third step is the formation of liquid menisci between formulation and skin that allow for long-lasting penetration.

**Prof. Dr. Martina Meinke, Charité: "EPR application to monitor cutaneous penetration of actives"**

Electron paramagnetic resonance (EPR) spectroscopy can be used to monitor the penetration of substances into the skin. The substances have to be EPR active or must be labeled with a spin probe and can be loaded to several nanocarriers or

applied as nanocrystals. EPR can contribute to obtain quantitative data and to observe drug release in skin tissue non-invasively thus complementing optical methods.

**Dr. Maxim Darvin, Charité: "Raman microspectroscopy for analysing the penetration and influence of topically applied substances on the stratum corneum"**

This presentation described the recent developments and advantages of confocal Raman microspectroscopy in determining both penetration depth profiles and influence of topically applied formulations on the human stratum corneum in vivo and completely non-invasively. It was shown how the topically applied exemplary cosmetic oils affect the lateral packing order of intercellular lipids and water-binding properties and how this is associated with the penetration depth, skin occlusion and swelling of the *stratum corneum*.

**Dr. Sabilla Digel, Berg & Schmidt GmbH: "smartLipids - carriers for barrier protection and improved active ingredient transport"**

Very small in size, but with a very big impact: BergaCare SmartLipids are the 3rd and latest generation of lipid-based carrier systems. In this presentation, the participants found out how they act on the skin and what benefits they exhibit in cosmetic skin care formulations. No matter if Anti- Aging, Whitening or the restoration of the Skin Barrier – many different applications of SmartLipids have been commercialized, making them even more effective and easy to use.

**Dr. Christian Rimpler, Dr. Rimpler GmbH: "smartCrystals - innovative vehicles for poorly soluble molecules"**

The incorporation of identified active ingredients into cosmetics often presents the developer with major challenges. In collaboration with the Free University of Berlin, research has been done on solutions that nanotechnology has opened up. Today we basically have 2 different systems, which have become known as Smart Lipids and Smart Crystal technology. The performance of these technologies to protect active substances and to enable their penetration and increase in bioavailability at the site of action was demonstrated using a number of examples.

**Dr. Maria Reichenbach, Symrise AG: “New Retinol Alternative: Screening approach utilizing next generation sequencing”**

Retinol is the star ingredient in anti-aging cosmetic care, but retinol and its derivatives elicits side effects including inflammation, redness and dryness especially during long-term use. Thus, there is a current need to find retinol alternatives exhibiting the same biological effects while lacking the unwanted side effects. For this purpose, Symrise performed whole transcriptome profiling utilizing next generation sequencing to identify ontological gene clusters constituting relevant marker genes reflecting several areas of barrier improvement induced by retinol. In a holistic screening approach of a 1500 compound library, Hydroxypinacolone retinoate was identified as the best candidate helping the upregulation of the relevant marker genes and exhibiting epidermal thickness and skin barrier improvement, thus constituting a convenient retinol alternative.

**“Help! I’m Covered in Adjectives” - Cosmetic Claims & The Consumer” by Dr. Theresa Callaghan, Callaghan Consulting International**

A book on this lecture has also been published, which you are welcome to order in our book shop [www.sofw.com/en/shop](http://www.sofw.com/en/shop):



**Sponsors and their presentations**

**Léa Schmidt, Symrise AG: “Supporting the skin microbiome for a healthy balanced skin”**

A healthy skin microbiome has a diverse microbial population that acts as a first line of defense against pathogens. Symrise is exploring new ways to care for the skin and its microbiome in developing efficient cosmetic solutions. The paraprobiotic ingredient SymReboot™ L19 supports the skin’s health and provides a strengthened healthy environment for the skin and scalp microbiomes without altering their natural composition. And the latest study shows that the refreshing ingredient Frescolat® ML decreases sweat odor by acting selectively on anaerobic axillary bacteria and supports deodorant activity.

**Marco Wolf, Woresan GmbH: “How to support the skin’s microbiome?”**

Short training on the benefits of ferments in cosmetic products. Like any ecosystem, the skin is confronted with a variety of influences on its different parts. Every ecosystem consists of inanimate (abiotic) and animate (biotic) elements. In the case of the skin, the biotic elements are the numerous microorganisms that colonize the skin’s surface. This lecture showed how to support the skin’s microbiome by using ferments.

**The skin is the largest and most versatile organ of our organism and therefore a very important linchpin in the personal care industry.** The intensive researches of the different universities, institutes and free market economy are therefore indispensable and show in the presented lectures how important they are. This was also confirmed by our participants. On average, **92 listeners** attended the presentations.

**Our Highlight**

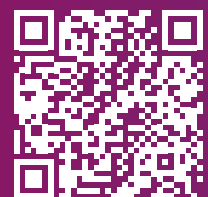
*More live moderation in the new lobby*



Now that the **SOFW eEVENT** series is really well established in the market, it is time to upgrade the technology and the look of the live stream to a new level. For this we have bought **new furniture, technology and decoration**. We have also extended the live moments with summaries of the presentations by an industry expert, **Martin Albrecht**. We are responding to customer requests and are happy to see that this is going down well!

**You couldn’t attend the SKIN eEVENT?**

Don’t worry! Now you have the opportunity to watch all presentations and interviews for only 75€. Our **>>AFTER eEVENT<<** is now open and all presentations of our SKIN eEVENT are available for you.



On **December 2, 2021**, we will host the last **eEVENT** of the series for this year under the theme **“Rapunzel, don’t let your HAIR down!”**. Beard and scalp hair care, styling, coloring, protection and prevention of grease and graying will be among the topics covered.

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## astaLIP

BDI10-1.1-218, AstaCos® OL50

**Status:** Laboratory Formula

Phase	Ingredient	INCI (EU)	Supplier	% by weight
<b>A</b>	Castor Oil, refined	Ricinus Communis Seed Oil	Sophim	39.95
	Jojoba Oil, refined	Simmondsia Chinensis Seed Oil	diverse	5.00
	Kahlresin 5723	Glyceryl Rosinate; Octyldodecanol	KahlWax	10.00
	Softigen Pura Organic	Olus Oil	IOI Oleo	15.00
	Cetiol SB 45	Butyrospermum Parkii Butter	BASF	8.00
	Kahlwax 8104	Cera Alba	KahlWax	5.00
	Cera Bellina	Polyglyceryl-3 Beeswax	Koster Keunen	3.00
	Kahlwax 2039L	Candelilla Cera	KahlWax	3.00
	dermofeel® viscolid	Hydrogenated Vegetable Oil	Evonik Industries	10.00
	dermofeel® Toco 70 non GMO	Tocopherol; Helianthus Annuus Seed Oil	Evonik Industries	0.50
<b>B</b>	AstaCos® OL50	Haematococcus Pluvialis Extract, Simmondsia Chinensis Seed Oil, Lecithin, Tocopherol, Helianthus Annuus Seed Oil	BDI-BioLife Science	0.25
	Perf. Nat. Cherry Vanilla 2002747	Perfume; Limonene; Linalool	Düllberg	0.30

**Manufacturing Procedure:**

1. Fuse elements of Phase A until clear at 80-85°C.
2. Cool mass down to 78°C. Add components of Phase B to those of Phase A while stirring and solve particle free.
3. Pour into lipstick-form at 78-75°C
4. After cooling down to room temperature, let the forms freeze out at -18°C for 30 min.
5. When having reached room temperature, retract sticks from the cases.

**Specifications:**

Appearance: Orange wax stick

**Stability:**

More than 3 months stable at 20°C, 40°C and 4°C.

**Description:**

Exclusive natural care components like precious AstaCos® provide regeneration and elasticity for the lips as well as wrinkle reduction. Moisturizing effect, especially recommended for usage at low and dry temperatures as well as wintersports like skiing etc. – successfully tested in Austrian winter conditions.

**DISCLAIMER:** The information on the formulation, which is based on our best knowledge, as well as all other technical information are based on the current state of our experience and are given exclusively as an indication. They do not establish any liability or other legal responsibility on our part. The user must convince himself of the application properties and stability of the product as well as undertake all patent-related tests. BDI-BioLife Science does not give any guarantee and declines any responsibility for the use of this formulation. It is intended for users and technicians only. For further information, please contact us at office@bdi-biolifescience.com.

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# FORMULATIONS

# astaBODY

BDI10-3-1117, AstaCos® OL50

**Status:** Laboratory Formula



Phase	Ingredient	INCI (EU)	Supplier	% by weight
<b>A</b>	Deionized Water	Aqua		71.15
	Keltrol CG-SFT	Xanthan Gum	CP Kelco	0.50
	dermosoft® Pentiol eco	Pentylene Glycol	Evonik Industries	4.00
	Amisoft HS-11P(F)	Sodium Stearoyl Glutamate	Ajinomoto	0.30
<b>B</b>	dermofeel® GSC	Glyceryl Stearate Citrate	Evonik Industries	3.00
	dermosoft® GMCY	Glyceryl Caprylate	Evonik Industries	0.50
	Lanette 16	Cetyl Alcohol	BASF	3.00
	Eutanol G	Octyldodecanol	BASF	6.00
	dermofeel® TC-7	Triheptanoin	Evonik Industries	6.00
	Sheabutter, refined	Butyrospermum Parkii Butter	Henry Lamotte	5.00
<b>C</b>	AstaCos® OL50	Haematococcus Pluvialis Extract, Simmondsia Chinensis Seed Oil, Lecithin, Tocopherol, Helianthus Annuus Seed Oil	BDI-BioLife Science	0.05
	Mandarin Oil Red	Citrus Reticulata Peel Oil; Limonene	Wadi	0.50

#### Manufacturing Procedure:

1. Solve components of Phase A in sequence while stirring until clear (t = 70° to 75°C).
2. Heat up elements of Phase B to 70°C and solve until clear. Disperse AstasCos® before emulsifying in elements of Phase B.
3. Add components of Phase B to those of Phase A while stirring.
4. Homogenize until a smooth emulsion is gained.
5. Cool down to room temperature. Add components of Phase C to no more than 40°C.

#### Specification Values:

Appearance: Orange emulsion, pH-value: 5.5 to 6.5  
 Viscosity (Brookfield: RV6:Speed 10): 7.000 to 18.000 mPas, Centrifugation (4.000 rpm, 15 min.): No separation

#### Stability:

More than 6 weeks stable at 20°C, 40°C and 4°C.

#### Description:

Formulation designed to restore and preserve healthy skin, e.g. after cleansing. Provides moisturization, elasticity and best spreadability to skin with refreshing effect when applied. Natural AstaCos® to supply the skin with the "King of Carotenoids" – the famous astaxanthin. In this application it is used as natural colorant, strong antioxidant and eliminator of free radicals.

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# FORMULATIONS

# asta2PHASE

BDI10-1.2-320, AstaCos® OL50



## Status: Laboratory Formula

Phase	Ingredient	INCI (EU)	Supplier	% by weight
<b>A</b>	Jojoba Oil	Simmondsia Chinensis Seed Oil	Henry Lamotte	14.52
	Sunflower Oil	Helianthus Annuus Seed Oil	Henry Lamotte	4.36
	MCT neutral Oil	Caprylic/Capric Triglycerides	Henry Lamotte	10.37
	dermosoft® Toco 70 non GMO	Tocopherol; Helianthus Annuus Seed Oil	Evonik Industries	0.52
	Squalene	Squalene	Henry Lamotte	1.04
	AstaCos® OL50	Haematococcus Pluvialis Extract, Simmondsia Chinensis Seed Oil, Lecithin, Tocopherol, Helianthus Annuus Seed Oil	BDI-BioLife Science	0.10
<b>B</b>	Dest. Water	Aqua	divers.	59.10
	Hyaluronic Acid	Sodium Hyaluronate	Hyacare	0.10
	dermosoft® 1388 ECO	Dermosoft; Sodium Anisate, Glycerin, Aqua, Sodium Levulinate	Evonik Industries	2.58
	dermosoft® GMCY	Glyceryl Caprylate	Evonik Industries	0.52
	Propanediol Natural	Propanediol	Cosphaderm	2.08
	Glycerin	Glycerin	Henry Lamotte	4.67
	Tonka Bean Extract	Lactobacillus	divers.	0.04

### Manufacturing Procedure:

1. Mix elements of oil phase together with astaxanthin and tonka extract, homogenize slightly.
2. Mix elements of water phase. Pour hyaluronic acid into water and let it swell. Add glycerin, propanediol. Stir and only then add Dermosoft GMCY and 1388 and homogenize well.
3. Fill separately. 28% oil phase and 72% water phase.

### Specifications:

Appearance: Clear water phase, intense orangish oil phase

### Stability:

More than 3 months stable at 20°C, 40°C and 4°C

### Description:

asta2PHASE regulates the skin's moisture balance: the natural active astaxanthin protects the skin from free radicals and damage through UV radiation, while hyaluronic acid ensures a smooth, even skin texture. Astaxanthin takes effect embedded in the cell membrane: the fat-soluble active ingredient protects important phospholipids and other essential fatty acids effectively against peroxidation. As the astaxanthin molecule - in contrast to other carotenoids and vitamin E - extends through the entire lipid bi-layer, both the inside and the outside of the membrane are protected outstandingly.

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# Glass Cleaner with Biosurfactant



Ingredients	% by weight
Water	94.00
<b>REWOFERM® SL ONE</b>	<b>1.00</b>
Caprylyl/Capryl Glucoside	1.00
<b>TEGOTENS® DO</b>	<b>1.00</b>
Alcohol	3.00
Preservative/Fragrance	qs

**Processing:** Blend ingredients while stirring until homogeneous.

**Appearance:** Transparent clear

**pH:** 6-7

**DISCLAIMER:**

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### home care

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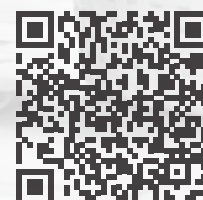
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## New Player Flags Holistic Approach of Clean Beauty

Bonn, Germany | 02.11.2021

The personal care industry has perhaps been the most unpredictable during the COVID-19 pandemic. The need of Personal Care products shifted from aesthetic beauty to hygiene like cleansing, caring and hand sanitizers.

After this challenging period, the Personal Care product sector is finding a more settled market, which focusses on new product development.

The view on holistic concepts including the philosophy of the body as balanced unit and the beauty from inside out have flourished in the last period.

Moreover, the consumer is looking for a combination of efficacy with natural and clean label products.

To help Personal care brands and developers with these demands, care-and-science focuses on bringing the know-how of formulating, a view into the cosmetics trends and the changing up-to-date standards to the Personal Care and "Beauty from within"-market.

The consultancy founded this year by Ute Wollenweber has chosen its name care-and-science to stress on the importance of science in cosmetics to obtain final formulae with silky feel, proven efficacy, and sustainable origin.

According to Ute Wollenweber, especially during the times of Covid-19 the demand for effective and clean protection of the skin is nowadays mandatory.

Skin and hair must be protected against frequent washing and sanitizing, and pollution including the effect of blue light of screens.

Developing clean products with these features is one of the most significant challenges faced by formulation chemists today.

At care-and-science, we support to fulfill this threat in several ways:

- To select raw materials for efficient final formulae
- To compare product developments against benchmarks
- To coordinate and analyse efficacy testing's
- To wrap up the results into brochures, presentations, and publications

Next to the need of clean beauty, care-and-science rounds up its profile with a new topic: Nutricosmetics, harnessing the best of nature.



We are collaborating with international experts in the nutrition and botanicals sector and bundle our know-how to complete the cycle of the "holistic concept" of skin and body, taking into account "beauty from within" and its regarding factors.

Whether you are seeking for raw materials or new cosmetic formulations, the coordination and analysis of efficacy studies or need support in technical marketing – we look forward to helping you to realise your ideas and projects!

For detailed information, contact us via mail or telephone to learn more about our services.

info@care-and-science.com | +49 228 35029256  
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## Who wins the SOFW JOURNAL BEST PAPER AWARD 2021?

Coming soon: On **December 2, 2021**, we will present the SOFW award to the three best scientific articles published in the SOFW journal from November 2020 to October 2021.

An independent jury of industry experts had spent the past months evaluating all the articles and now we are proud to name the award winners! Are you already curious?

Then be there at the award ceremony:

**SOFW eVENT „Rapunzel don't let your HAIR down!“**  
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Free registration and further information at [www.SOFWeVENTS.com](http://www.SOFWeVENTS.com)

[www.sofw.com](http://www.sofw.com)



## HPCI CEE Warsaw

Celebrated its  
Tenth Anniversary

**Warsaw, Poland / Hannover, Germany | Oct. 2021**

The Central and Eastern European home and personal community gathered at the EXPO XII Centre, Warsaw from **22-23 September 2021**. The exhibitors of the number one event for the home and personal care industry in Central and Eastern Europe showcased their latest innovation not only onsite but also online. This modern, future-proof event concept offered significant additional benefits for exhibitors and visitors alike. The exhibitors were satisfied with their participation in HPCI CEE 2021, so that over 95% of the exhibition area was directly re-booked for 2022.

### Benefits of hybrid concept

The HPCI CEE 2021 could be attended by anyone, regardless of their budget or distance from the venue. Everybody registered to the event was able to network with on-site visitors as well as with online visitor either via the website or via the App. Our match-making allowed everybody to meet the right people to exchange contact data, ideas and arrange meetings.

### Educational programme

In addition to the show, HPCI CEE 2021 also offered an extensive programme of lectures with different focuses. The technical seminars provided an overview of the latest developments in raw materials for the formulation of cosmetics, home and personal care products. The program was rounded off by a scientific conference in which renowned speakers from industry and academia gave an insight into the latest findings and a poster session.

### Safety Assessor seminar

The one-day DGK/IKW Safety Assessor Seminar took place online and gave safety assessors again the opportunity to update themselves and exchange ideas with colleagues.

The **next HPCI CEE** (Home and Personal Care Ingredients Exhibition and Conference Central and Eastern Europe) will take place from **21 to 22 September 2022** at the EXPO XXI Exhibition Centre in Warsaw, Poland.

[www.hpci-events.com](http://www.hpci-events.com)



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OPPORTUNITY  
TO WIN!

## More Space to Rev Up

Schenefeld, Germany | 18.10.2021

**Clear indications for growth: The services of the cosmetics developer Cosmacon are in high demand – in Germany and internationally. Now, the Schenefeld-based company has moved into larger business rooms to give the team members more space to develop their skills to the full.**

Dynamics instead of stagnation. While many cosmetics companies got short of breath during the pandemic year 2020, Cosmacon has been able to achieve great growth. Cosmacon GmbH accompanies cosmetics companies and firms striving to establish an own cosmetics brand in each step on the way to a successful product: from product development, formulation of the cosmetic product to market introduction.

With real success! The online trade in cosmetics is booming and Cosmacon has adapted its services and performances to meet the requirements of the online sellers in Germany and worldwide. Thereby, Cosmacon not only survived the corona crisis but has created increase.

### **The essential resource: contented colleagues**

Colleagues with excellent expertise in cosmetics are the basis to accomplish the extensive quota of orders. Therefore, Cosmacon doubled the number of staff members during the last eighteen months and has moved into the new premises in the city of Schenefeld with its team. The office and laboratory area of 280 square meters gives more space to the 10 staff members and features new, modern equipment. The desk workplaces are fitted with two monitors for each colleague and ergonomic desks and seats. Air-conditioning systems and air filters provide a beneficial and sure working atmosphere in the light, large rooms. The modern IT system and the large-scale equipment of the laboratory complete the generous ambience.

“We wanted to involve our staff members and asked them in the planning phase what they wish and what they consider to be important in the equipment”, Rainer Kröpke, managing director of Cosmacon, explains. „It is essential that the team members feel well; that is the basis of good work.“ The location of the business premises in the city of Schenefeld is an advantage for the team. „The journey to remote industrial estates often is unattractive for colleagues and business partners“, Kröpke says. „The city of Schenefeld with its gastronomy, shopping facilities and good traffic linkages offers opportunities to connect professional and private matters.“



### **Cosmacon's recipe for success**

The new business premises offer more space for the team and the opportunity to work together in an efficient network. That means that orders can be completed rapidly, meeting high quality standards. An essential component in Cosmacon's recipe for success. Normally, the period from the idea to the market launch of a cosmetic product takes up to a half year. Cosmacon is able to offer the customers an express service: in less than three months to the finished product.

„Especially our customers who mainly sell online appreciate this service. They do not want to wait so long for the product, and they want to reorder at short notice to get not of-of-stock“, Kröpke tells.

### **Expertise – used broadly**

Quick product development and quality „Made in Germany“ – that is what customers worldwide appreciate. Numerous partners in Europe, Asia, Africa, and Australia rely on the expertise and the talent of Cosmacon in development, conceptualizing and organization in cosmetics. To respond especially to the needs of international customers Cosmacon's head Rainer Kröpke has outsourced Innosic GmbH, whose specialists develop and market superior cosmetic products for customers out of Europe.

Another Cosmacon spin-off company is Cosactive GmbH. Cosactive has specialized in manufacturing, development, and trade of high-quality raw materials for cosmetic and pharmaceutical products. A logical step for Rainer Kröpke: „Cosmacon and our customers require superior raw materials, available as promptly as possible in sufficient quantities. The experts of Cosactive are ready to perform that.“

Cosmacon GmbH, based in Schenefeld near Hamburg, was founded by Rainer Kröpke in 2013. The service company gives advice and develops cosmetic products, also natural cosmetics, for companies in the field of personal care and cosmetics. The customers include brand and raw material producers, cosmetic institutes and distributors in Germany as well as international groups. More information on the company and the services of Cosmacon as well as an extensive glossary on several cosmetics subjects under:

[www.cosmacon.de](http://www.cosmacon.de)



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## personal care

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## Givaudan Active Beauty Unveils [N.A.S.]™ Rosemary 01 the Organic BHT Challenger



### Argenteuil, France | 03 November 2021

Givaudan Active Beauty strengthens its portfolio by launching [N.A.S.]™ Rosemary 01, a functional cosmetic ingredient that challenges butylated hydroxytoluene (BHT) by outperforming its efficacy in a natural and organic way. Crafted by green fractionation from rosemary sustainably sourced mainly in Morocco, our new ingredient offers antioxidant benefits superior to BHT and BHA and some natural solutions while protecting botanical oils and stabilizing colours.

The ability to offer beauty products that retain the perfect aspect, odour and colour is essential in the cosmetics industry. This first proof of product quality visible to the consumer ensures a positive perception and helps secure consumer loyalty. However, it is still challenging for formulators today to create a 100% natural origin formulation due to the use of synthetic preservatives.

[N.A.S.]™ Rosemary 01 is an organic certified ingredient crafted by green fractionation from handpicked rosemary leaves, sustainably sourced mainly in the Atlas mountains of Morocco. Controlled through IDPack1, an exhaustive set of analyses including botanical observation, DNA analysis, HPTLC and HPLC measurement, this antioxidant solution is able to offer pure and natural claims to the cosmetics market.

Yohan Rolland, Global Category Manager, said: *"The current set of synthetic antioxidants used in cosmetic products, such as BHA, BHT and synthetic tocopherols, are effective but contested by an increasing number of consumers. Our scientists rose to the challenge of finding organic and even more efficient alternatives to offer formulators a sustainable way to create finished cosmetic products with 100% natural origin ingredients."*

[www.givaudan.com](http://www.givaudan.com)



## Lipoid Kosmetik AG Launches Herbamilk® Eco line Vegan Milk for Cosmetic Use

### Steinhausen, Switzerland | 03 November 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 Herbamilk® Eco line.

Plant-based milk alternatives are a food trend on the rise and as veganism rises in popularity, it expands from food to other elements of consumer's lives, such as beauty and personal care.

To accommodate the trend of non-dairy milk in cosmetics, Lipoid Kosmetik offers the COSMOS-approved and 100% natural Herbamilk® Eco product line, which combines natural plant oils and natural plant extracts with the help of hydrogenated phospholipids.

Herbamilk® Eco shows the following user benefits:

- Moisturizing, re-fattening, emollient
- Appetizing vegan milk product concepts
- Giving a milky appearance to products
- Facilitating the incorporation of oils into surfactant products

Herbamilk® Eco is the perfect ingredient to create milk-based concepts and attend the vegan and health-conscious trend in cosmetics.

Lipoid Kosmetik is a leading manufacturer of natural raw materials for the cosmetic and personal care industry. High-quality botanical actives and extracts (Lipoid Kosmetik AG, Switzerland) as well as pharma grade natural lecithins and phospholipids (Lipoid GmbH, Germany) are part of our sophisticated portfolio.

[www.lipoid-kosmetik.com](http://www.lipoid-kosmetik.com)

## Cargill Beauty Draws Inspiration from the Sea with Kappa Carrageenan Addition

Minneapolis, MN, USA | 25 October 2021

As demand for eco-friendly personal care products continues to grow, Cargill is completing its portfolio of carrageenans with the addition of Satiagel™ VPC614, a kappa carrageenan specifically suited for high gelling applications and solid formulations. Nature-derived and fully biodegradable, Cargill's kappa carrageenan combines performance, versatility and sustainable sourcing. Obtained from red seaweed, kappa carrageenan forms solid, brittle gels when used alone, making it perfect for face sheet masks and solid skincare solutions. However, blending the new ingredient with Cargill's existing iota and lambda carrageenan grades opens the door to even greater sensory exploration, enabling brands to form original and inspirational textures, from textured waters to solid gels.

"Carrageenans have so much to offer formulators, especially when used in combination," said Jean-Noel Ollagnier, R&D Manager, Applications for Cargill Beauty. "Now with all three carrageenans in our portfolio, we can help brands create seemingly unlimited sensory experiences, drawing on their unique textures, viscosities, gelling and thickening properties to create personal care products truly inspired by nature."

This expanded versatility enables formulators to incorporate carrageenans into a wide array of products, including serums, emulsions, creams, lotions, bodywashes, shampoos and hair-styling gels, as well as toothpaste and mouthwash. Equally important,



the botanically sourced ingredients align with consumer desires for more natural cosmetic products with cleaner labels. All three carrageenan ranges have the same INCI (International Nomenclature Cosmetic ingredient) reference, helping personal care manufacturers minimize the number of ingredients listed on product labels.

In developing the new kappa line, Cargill Beauty researchers leveraged the company's half century of experience with carrageenan, drawing on its manufacturing and formulation expertise, as well as its commitment to responsible seaweed sourcing. Toward that end, Cargill launched its Red Seaweed Promise™ in 2018. This industry-leading program works to address key challenges in producing and harvesting red seaweeds in close partnerships with farmers. It supports seaweed producers' prosperity by providing the training, coaching and tools they need to adopt environmental production best practices, supporting sustainable marine and coastal ecosystems.

"It's no longer enough to create products that perform – today's eco-conscious consumers are drawn to options they view as simple, natural and sustainable, too," Ollagnier said. "Our comprehensive carrageenan line helps make it possible for brands to deliver on all these counts."

[www.cargill.com](http://www.cargill.com)

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# Handbook for Cosmetic Preservation

Dr Barbara Oliso, MRSC

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