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64th SEPAWA Congress & 13th European Detergents Conference

18-20 October 2017, Estrel Congress Center, Berlin, Germany

K. Henning

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Photo: *K. Heyer*

European Detergents Conference

SEPAWA®
detergents · cosmetics · fragrances

The 64th SEPAWA Congress was held in conjunction with the 13th European Detergents Conference (EDC) at the Estrel Congress Center in Berlin.

The change of venue to Berlin was well received, as evidenced by an increase in the number of delegates, to more than 3,000 from 49 countries, as well as growth in the number of exhibitors, to 254 companies. These figures represented new records for both participants and exhibitors.

A programme of 39 scientific lectures offered a broad range of comprehensive information on the characteristics and functions of surfactants and detergents, examining both the scientific basis of these products in the 13th European Detergents Conference, as well as their practical applications in the different sessions on detergents, cleaning products and cosmetics. The lecture series "Forum for Innovations" featured 69 short presentations on new product developments, applications and procedures for detergents and cosmetics.

The Detergents Committee of the German Chemists Society (GDCh/HAD) and the SEPAWA Specialist Group Legislation, Environment and Consumers (LUV) addressed the subject of the sustainability of detergent ingredients with joint reports on the biodegradability of fragrances in detergents, the traceability of certified oil palm products and the marketplace for RSPO credits, and current legislative regulations.

The cosmetics lectures covering care and protection of skin and hair by individual substances and new applications were presented in conjunction with the SEPAWA Specialist Group Cosmetic Applications and Technology (CAT) and the German Society for Scientific and Applied Cosmetics (DGK).

The German Society of Perfumers (DGP) presented an interactive show about fragrances entitled "Bridge of Senses", shared treasures from the Osmothèque in Versailles and revealed new paths in the perfumery sector.

The SEPAWA Young Researcher Award was presented for 3 outstanding master's, 2 bachelor's and 3 doctoral theses. The SEPAWA Innovation Award for new developments in the field of cosmetics and detergents was granted to 3 prizewinners.

In addition, the GDCh Specialist Group Detergency and Formulations awarded the Young Researcher Award for outstanding scientific research at the 13th European Detergents Conference.

Structures and Properties of Surfactant, Nano, Micro and Gel Systems

At the **European Detergents Conference**, 10 lectures and 16 poster presentations addressed, among other topics, functional nanosystems for the transport of active substances, nanoreactors and artificial organelles, microemulsions with long-chain n-alkanes and waxes, self-assembly of low molecular weight, mimicking natural membranes utilising transmembrane protein polymer conjugates and gelled lyotropic liquid crystals.

In this subject area, ***Dr. André Laschewsky***, University of Potsdam and Fraunhofer Institute for Applied Polymer Research IAP, reported on "Schizophrenic amphiphilic polymers: turning surfactants upside-down and micelles inside-out."

Zwitterionic polymers are much studied for highly biocompatible and non-immunogenic materials, by virtue of their similarity to cell membranes that are composed mainly of zwitterionic phospholipids. Among the various families of polyzwitterion classes, poly(sulfobetaine)s excel by virtue of their chemical and physical stability, as well as the pH-independence of their zwitterionic character [1]. Furthermore, many poly(sulfobetaine)s display thermo-responsive behaviour in aqueous media. Remarkably, and in contrast to most known thermo-responsive water-soluble polymers, which show a coil-to-globule collapse transition with a lower critical solution temperature (LCST), poly(sulfobetaine)s may undergo such a transition showing an upper critical solution temperature (UCST) [2].

Exploring the use of poly(sulfobetaine)s blocks as versatile building blocks for "smart" and biocompatible polymers, a series of dual-responsive double-hydrophilic block copolymers have been designed [3]. These copolymers are composed of zwitterionic and non-ionic blocks, and consequently feature a UCST as well as a LCST transition. Adjusting the structure of the polymer blocks properly allows for a stepwise switching of the copolymers, from an amphiphilic character at low temperatures to a fully soluble, double-hydrophilic polymer at intermediate temperatures, and back to an amphiphile at further elevated temperatures.

The scheme of the temperature-controlled behaviour of schizophrenic amphiphilic block copolymers is shown in **Fig. 1**.

In this course of transformations, the role of hydrophilic and hydrophobic blocks are exchanged, and the micellar structures turn inside-out. This pattern of self-assembly is often referred to as "schizophrenic" [4]. The switching of schizophrenic of amphiphilic block copolymer by dual thermo-responsive block copolymers with both UCST and LCST transition is shown in **Fig. 2**.

Surfactants, Chelants, Enzymes, Preservative Systems and Easy-to-Clean Additives in Detergents

In the **session Laundry and Cleaning Detergents**, 7 lectures addressed the properties, applications and new developments of products. The topics included proteins as an easy-to-clean additive in water-based cleaners, a retard system for surface cleaning, the expectations of the new GLDA and MGDA chelators in detergents and for raising the bar in household care with new lipase technology and polyoxyethylene alkylether carboxylic acids as all-round surfactants, an intelligent preservative system that complies with legal requirements and the performance assessment of automatic dishwasher detergents.

In his lecture, entitled "Attractive rather than repellent: proteins as an easy-to-clean additive in water-based cleaners," ***Dr. Matthias Reihmann***, Gelita AG, Eberbach, Germany, presented a new cleaning process through which a hydrophilic protective layer on the surface is formed.

Common practice in industrial cleaning (e.g., vehicle cleaning) is the application of additional water-repellent protective layers, which produce a hydrophobic surface. For example, wax products, silicone compounds, nanotechnology or so-called Lotus-Effect® coatings are used to

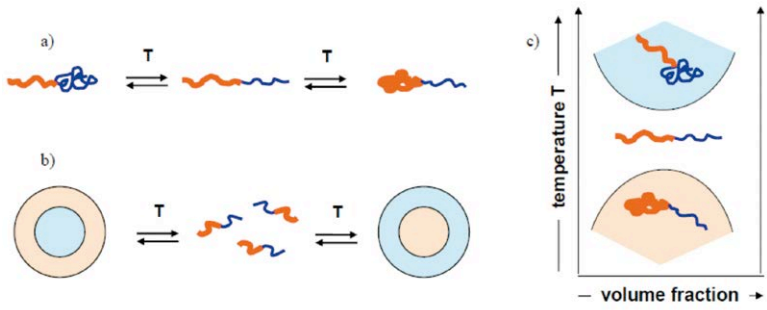


Fig. 1 Scheme of the temperature-controlled behaviour of schizophrenic amphiphilic block copolymers: a) evolution of amphiphilicity b) evolution of self-assembly c) simplified phase diagram

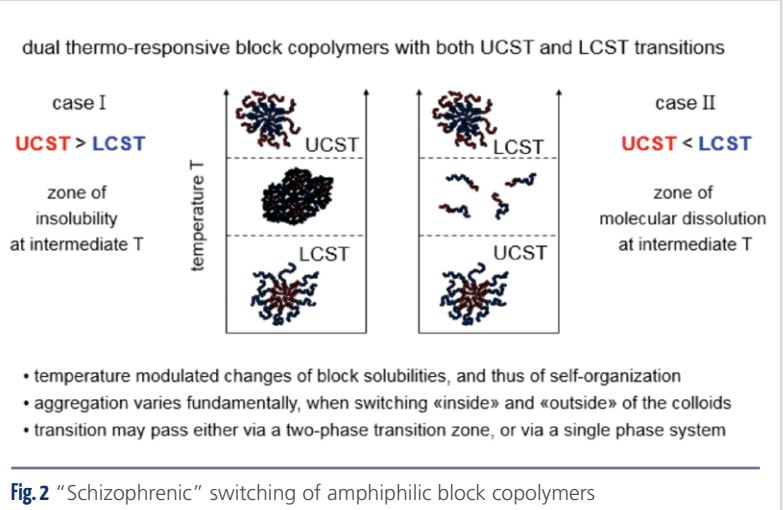


Fig. 2 "Schizophrenic" switching of amphiphilic block copolymers

[1] *A. Laschewsky*, Polymers 6 (2014) 1544; [2] *A. Laschewsky*, Polymers 6 (2014) 1544, *V. Hildebrand et al.*, Polym. Chem. 7 (2016) 731 and ibid. 8 (2017) 310
[3] *N. Vishnevetskaya et al.*, Macromolecules 49 (2016) 6655 and references therein; [4] *J.V.M. Weaver et al.*, Chem. Commun. 38 (2002) 2122

extend cleaning cycles and simplify subsequent cleaning steps.

A completely new method of protecting cleaned surfaces uses functional proteins, which can easily be added to existing water-based cleaning systems. These proteins absorb on many surfaces, such as metal, plastic or glass, leading to the formation by interaction via hydrogen bonds of a stable but swellable bound protein network. As soon as water droplets hit the surface, the protein network attracts the water molecules and creates a closed, hydrophilic protective layer. This protective layer facilitates subsequent cleaning (**Fig. 3**).

In contrast to existing water-repellent coatings, especially with Lotus-Effect®, by which water rolls off an extremely unwettabble surface, the soil floats on the aqueous protein film of protein-protective layers and can be displaced from the surface by gentle rinsing with water (easy-to-clean effect). This results in a self-cleaning effect, which significantly extends cleaning intervals. Furthermore, this technology allows a considerable reduction in environmental impact and resource consumption (**Fig. 4**).

The advantage of cleaning agents based on protein-protective layers has been demonstrated by observing 90 coaches in a comparative study over a period of three years by a train operator that could extend its average cleaning cycles from two days to two weeks. It was also confirmed that, because of the protective nature of the protein layers, less soil adhered to the vehicle surface. Thus, the new concept with hydrophilic protein-protection layers allows the formulation of high-performance and completely biodegradable cleaners that are suitable for effective regular maintenance cleaning even at very mild pH values of about 7.5.

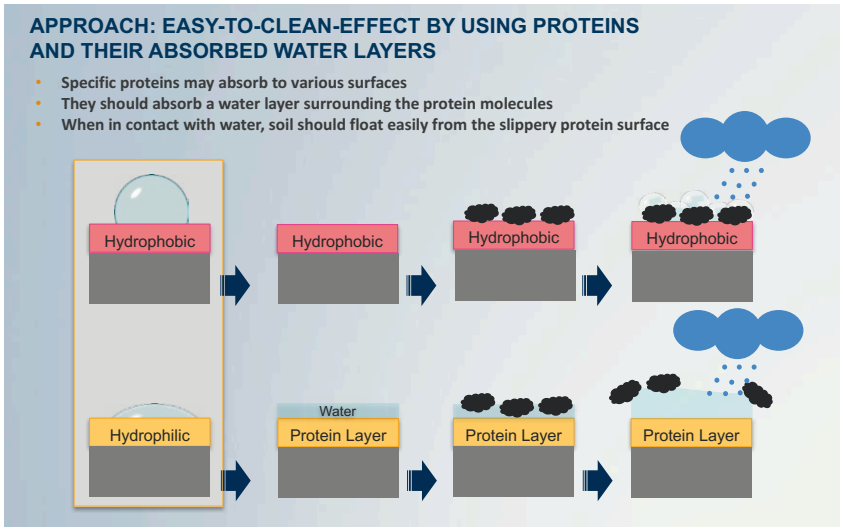
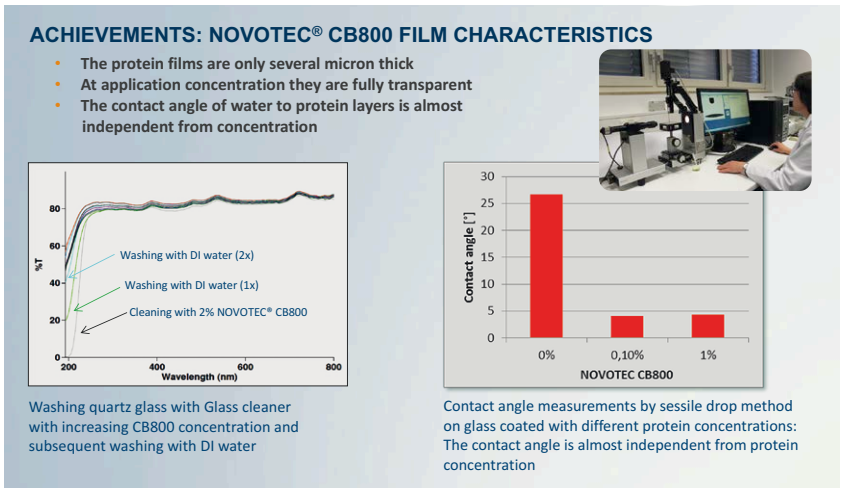


Fig. 3 Easy-to-clean effect of using proteins and their absorbed water layers (©Gelita AG)



Washing quartz glass with Glass cleaner with increasing CB800 concentration and subsequent washing with DI water

Contact angle measurements by sessile drop method on glass coated with different protein concentrations: The contact angle is almost independent from protein concentration

Fig. 4 Achievements: Novotec® CB800 film characteristics (©Gelita AG)

SEPAWA Young Researchers' Award

The annual **SEPAWA Young Researchers' Award** is one of SEPAWA's most important activities, helping to promote the training of the next generation. The prize is given to students for outstanding bachelor's, master's and doctoral theses. From the submitted theses, the jury selected 8 prizewinners.

Two prices were awarded for outstanding bachelor's theses. The first prize was given to ***Hilal Bahceci***, Beuth University of Applied Sciences, Berlin, for her thesis, "Production and investigation of naturally based surfactant-stabilised emulsions and their application in anti-ageing products and lip boosters". The second prize was given to ***Jan Ebbeke***, University of Applied Sciences, Ostwestfalen-Lippe, for his thesis, "Investigations of the influence of 1,2-alkandioles on physical-chemical characteristics of multiphase systems".

Three prizes were awarded for outstanding master's theses. The first prize was awarded to ***Matthias Müller***, Fraunhofer Institute for Applied Polymer Research, Potsdam, for his thesis, "Synthesis and characterisation of new water-soluble glycopolymers." The second prize went to ***Ricarda Kohlen***, Niederrhein University of Applied Sciences in cooperation with Evonik Nutrition & Care GmbH, for her thesis, "Rinse-on sun protection formulations – formulation concepts and development of methods," while the third prize was awarded to ***Aimée Nottingham***, University of the Arts London, for her thesis "Analysis of the antioxidant capacity of plant extracts in cosmetic formulations using chemiluminescence method."

Three prizes were awarded for outstanding doctoral theses. The prizes went to ***Dr. Kristin Ganske***, University of Jena, for her doctoral thesis, "Nucleophilic reactions for the design of new cellulose derivatives as functional polymers", to ***Dr. Meike Schlingmann***, University of Manchester, for her doctoral thesis, "Identification and investigation of polymer properties controlling the performance of hair-styling mousses," and to ***Dr. Leonardo Chiappisi***, University of Berlin, for his thesis "Ionic co-assembly in mixtures of polysaccharides and surfactants."

The picture shows the prizewinners. (Photo: *K. Heyer*)

Sustainability and Safety of Detergents

In the **LUV/HAD GDCh Session**, 7 lectures covered sustainability, safety labelling, EU Ecolabel criteria and EU chemical legislation. The topics addressed the impact of CLP regulation on the institutional cleaning sector, the possibilities of more effective and efficient safety labelling of detergents, the biodegradability of fragrances in laundry detergents and cleaners, Europe's transition to a circular economy considering EU Ecolabel criteria on detergents, new requirements for packaging as challenges and opportunities in the circular economy, and the sustainability of palm(kernel) oil derivatives and traceability of certified oil palm products.

Dr. Anneliese Wilsch-Irrgang, Henkel AG & Co. KGaA, Düsseldorf, Germany, raised the question, "How about the biodegradability of fragrances in laundry detergents, cleaners and household care products?"

Consumers expect detergents and care products to be safe and efficient. The sensory assessment by the customer is particularly important in this regard, because the scent often influences not only overall acceptance, but also consumer's impressions of the products' performance during dishwashing, cleaning and laundry care. Detergents and care products contain perfume because fragrances play an important role in commercial success. (**Fig. 5**)

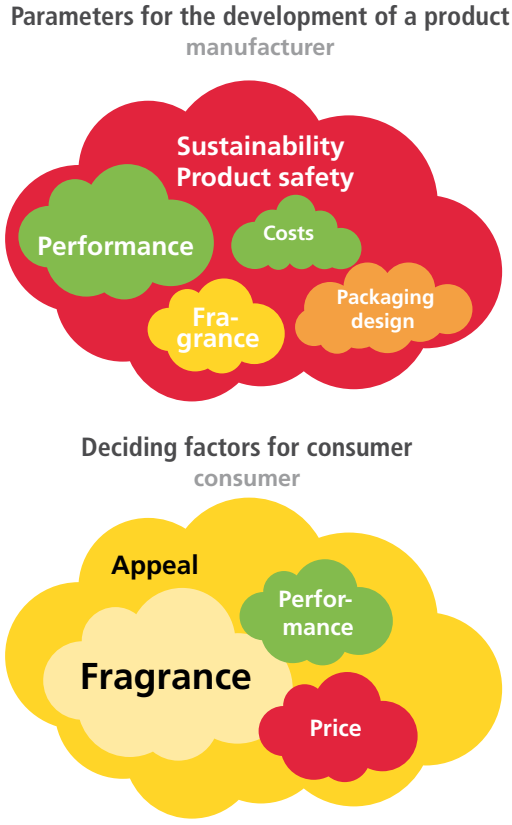


Fig. 5 Product design and purchase decision (©Henkel)

Fragrance Content of Detergents and Care Products

Fragrance content varies in the different product classes, ranging from 0.1–0.3 % in all-purpose cleaners, 0.1–1.3 % in washing powders, 3–10 % in toilet blocks and 1–100 % in air fresheners. Similarly, the composition of the perfume varies in the different product classes. Depending on the product's application, a volatile dispersion of the fragrance throughout the room (e.g., for room scents), or a pleasant scent of the product during application but without a lingering fragrance after application (e.g., for dish detergents), may be desired. For laundry detergents and fabric softeners, fragrances with good substrate adhesion and a long-lasting fresh smell are desired.

In the 2015 Sustainability Report of the German Cosmetic, Toiletry, Perfumery and Detergent Association (IKW), the total consumption of ingredients for detergents and care products amounted to 530,470 tonnes, including 9,027 tonnes of fragrances.

To achieve the desired fragrance effects for individual products, functional perfumes are composed of mixtures of a variety of different odorous substances. These can be natural substances, such as essential oils (e.g., citrus oil), which themselves comprise several different components. This also applies to plant fragrances, such as resins or natural extracts. Materials from animals are no longer used in applied perfumery.

In functional perfumes, the majority of fragrances are synthetic. In contrast to essential oils, these fragrances, which are designated as aroma chemicals, are available to a consistent quality and mostly in sufficient quantities. Economically, they are more efficient for consumer goods. A perfume formula contains 30-70 single components.

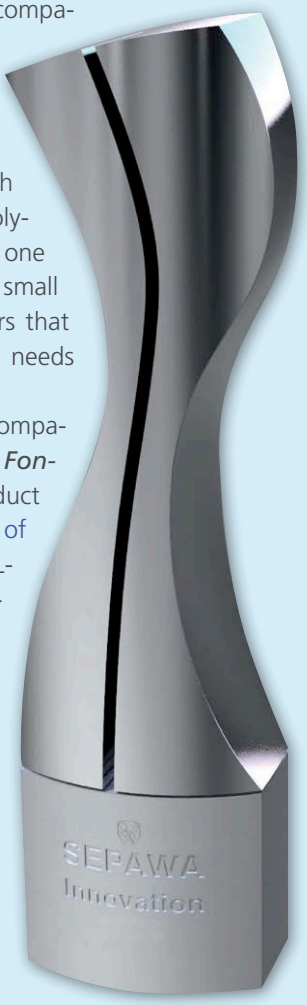
SEPAWA Innovation Award

Innovations are the key for growth and competitiveness, as well as an important pillar of our economy. Only by creating something entirely new can companies remain competitive in the global market. This year, for the fifth time, the SEPAWA Innovation Award in the field of cosmetics and detergents was given to three prizewinners. The prize is intended stimulate the active management of ideas in SEPAWA's member companies and raise public awareness to the chosen innovation. A neutral independent jury consisting of SEPAWA's Chairman and 6 members of the scientific board selected 3 prizewinners from the 28 proposals submitted. These included innovative raw materials, processes and concepts. The prize consists of a certificate and a trophy. The body of the trophy shows a stylised SEPAWA wave.

The first prize was given to ***Dr. Lilia Heider*** and ***Alexander Kielbassa***, Merck KGaA, for the "Advanced light protection with functional inorganic systems." An innovative concept for protective skin care has been developed. UV radiation accounts for only 5 % of the entire solar spectrum that reachs the earth. Specific titanium dioxide grades in combination with mica silica based functional fillers can protect the skin against both high-energy visible light and infrared light.

The second prize was awarded to the company SNS Nano Fiber Technology, and was accepted by ***Dr. Laura Frazier*** and Martina Spiegel for "Nanosan® nanofibers for decontamination of the skin." Nanosan presents a new approach to skin decontamination. Absorbent polyurethane fibres with diameters less than one micron are effective for removing even small particles from the skin. Unlike cleansers that require skin massage, Nanosan simply needs to be pressed onto the skin.

The third prize was awarded to the company Silab, and was accepted by ***Fanny Fondecave*** and ***Tanja Fourio*** for the product innovation "FILMEXEL – the Excellence of a natural, protective and lifting film." FILMEXEL is a preservative-free 100 % active powder that protects the skin from environmental chemical or mechanical aggressions. It reduces the penetration of pollutants, improves the overall appearance of the face and has anti-ageing properties through a lifting effect.



The picture shows the prize winners after the handing-over of the prize certificates by the Chairman of the SEPAWA ***Dr. Horst Lothar Möhle***. (Photo: *K. Heyer*)

Product Safety and Prohibition of Use

To ensure product safety for humans, animals and the environment, manufacturers define safety requirements for fragrances in briefings to the supplier. For the perfumes used, the ingredients of to labelling requirements under the Detergents Regulation are defined in the Scientific Committee on Consumer Products (SCCP) list, which includes 26 fragrances.

In addition, in 1996, the suppliers of fragrances and functional perfumes established the Research Institute for Fragrance Materials (RIFM) for the scientific investigation of the ecological and toxicological properties of fragrances. Based on assessment of the results by an independent panel of experts, recommendations for action to ensure the safe use of fragrances are provided.

On the basis of these recommendations the International Fragrance Association (IFRA) will publish standards for the safe use of raw materials. A transparency list itemises 3,999 materials that can be used in fragrances. For 191 materials, IFRA's standards define restrictions and prohibitions of use, such as for nitromusk or for geranonitrile for functional fragrances.

In addition, manufacturers of detergents and care products have defined further voluntary restrictions for single substances, and have proactively given up their use. For example, the IKW declared a voluntary ban on the use of musk xylene as long ago as December 1993 (IFRA banned musk xylene in 2009, Henkel banned nitromusk compounds in 2004). The use of geranonitrile has been banned by IFRA since 2006, and by Henkel since 2004.

Biodegradability

Perfumes are mixtures of several single components. Degradation tests, however, are significant only if they are determined with pure substances. An estimation based on the degradation data from single perfume components is therefore the norm.

Tests according to the OECD (OECD 301: Degradability within a time slot of 10 days within a total time of 28 days)are conducted to determine ready biodegradability. If the degradation is slower, degradation tests can be performed according to OECD 302, by which data are obtained for inherent degradability.

Because Henkel itself creates and produces perfumes, it has comprehensive data on the properties of the synthetic fragrances in its portfolio, which permits detailed analysis of biodegradability of the raw materials used. Information comes from the supplier's Material Safety Data Sheet of, the evaluation of IFRA and RIFM, and ECHA dossiers. Functional perfumes can contain up to 1,500 different raw materials, with a share of two-digit percentage up to one-tenth per mill. **Tab. 1** shows the composition of a model formulation of a perfume for a dishwashing detergent.

The main component (nearly 50 %) is the washable lemon terpenes, which are a natural mixture of different ingredients with limonene as the main ingredient. Further components are included in the single-digit percentage range, or in the per mill range, such as aldehydes, which will intensify and round off the odour.

Of greatest interest are ingredients that are included in terms of volume. For these odorous substances, the knowledge of the degradation behaviour is required by regulations such as the REACH Regulation. Given that many raw materials themselves are mixtures, such as the essential oils, or are produced only in small quantities, reliable figures on the degradation are not available for all ingredients used.

The data availability on the biodegradation of synthetic odorous substances in the company's own portfolio is as follows: biodegradability data are available for 60 %, which account for 95 % of the total amount of odorous substances used . Odorous substances for which data do not exist are used in only limited quantities. Readily biodegradable synthetic odor-

Ingredients	Content	Biodegradability according to OECD 301 (%)
Washable lemon terpenes	457.5	42-82
Phenylethyl alcohol	120	90-100
Dipropylene glycol	100	64-100
Terpinolene	95	62-80
Citronellylnitrile	80	69
Geraniol	50	90-100
Citral	40	92
Citronellol	20	80-90
Linalool	20	60-70
Triplal	15	4
Aldehyde C-10	1	82
Aldehyde C-12	0.9	73
Aldehyde C-8	0.5	46
Aldehyde C-9	0.1	83
Total	**1000**	

Tab. 1 Composition and biodegradation data of a model formulation of a perfume for a dishwashing detergent

ous substances account for 36 % of the total number, but only 70 % of the total volume.
To draw valid conclusions regarding the degradation behaviour of perfumes, the average biodegradation of the individual values of the raw materials must be mathematically estimated.
For the components of the model formulation shown in the table, biodegradation is calculated according to OECD 301. For washable lemon terpenes with the largest share, there are only limited data on biodegradation, yielding a wide bandwidth of 42-82 %. For the calculation of the biodegradation, the single values of the perfume mixture have to be weighted with their mass percentage in the mixture. If data are not available, the degradation rate is set at zero. For the model formulation of the dish detergent fragrance, the biodegradability is calculated at 59-85 %. Thus, at least 59 mass- % of the ingredients of the perfume oil are degraded according to the OECD tests for ready biodegradability in the required timeframe. In fact, because of the uncertainties associated with the citrus oil, the degradation will be significantly higher.
With this methodology, the average degradation for the perfume oils in Henkel's portfolio calculated at a minimum of 60 % according to the OECD tests for ready biodegradability within the demanded timeframe.

Protection of Skin and Hair

In the **CAT/DGK Session**, 10 lectures covered the human skin microbiota, pre- and probiotics and the epidermal barrier and unlocking the skin microbiome code, how to restore trust in measuring the sun protection factor (SPF), myths and facts on different hair bonding treatments concerning a possible repair of lightened hair, and the synthesis of structural variants of mannosylerythritol by combining various Pseudozyma sp. with hydrophobic substances.
The lectures on application of cosmetics addressed skin care with a leave-on rich aerosol-free foam, taking skin feel to the next level, the next generation of amphiphiles by Janus nanoparticles, balancing the skin microbiota by strengthening the skin barrier functions and supporting skin-own pathogen recognition and combining sensory formulation innovation and microbiome protection for whole-body rejuvenation.
In this section, ***Patrick Gonry***, GOVA Ingredients, reported on "Unlocking the skin microbiome code."
One of the skin's main functions is to build a protective barrier against environmental impacts. The epidermis forms a shield that keeps out undesirable chemicals and bacteria.
With up to 1,000 different species, microorganisms outnumber skin cells by 90 % to 10 %. Each person has an individual skin microbiota, and each part of the body has a different population: even the right and left hands are different.
Scientific research has shown that the skin barrier is protected by a far more impressive shield. A layer of microorganisms covers the epidermis. This microbiotic film forms an impenetrable labyrinth for harmful foreign microorganisms. The microbiotic layer and the epidermis form an inseparable film. Skin imperfections and discomfort may actually be the result of a disturbance of the protective microflora. The delicate balance of the skin micobiota can be disturbed by many factors, including pollution, excessive UV exposure, chemicals and aggressive cosmetic ingredients. If this barrier is weakened, the skin becomes sensitive, dry, infected, itchy and wrinkled, all of which age the skin.
The surprising influence of natural polysaccharides, such as inulin, agave sugar and mannose polymers, on the skin microbiota has been investigated through PCR measurements. These polysaccharides act as selective prebiotics. A prebiotic is a food supplement for the skin microbiota, which harmful


Photo: *K. Heyer*

microorganisms cannot metabolise. Hence the natural skin flora are reinforced and balanced.

These results are a game changer not only for the cosmetic treatment of an acne-prone skin, but also for the cleansing and disinfecting of any skin type. These findings also offer an intelligent approach to protecting and reinforcing the skin's general health.

Dr. Thomas Förster, Thomas Hippe, Georg Knübel, Henkel, raised the question, "Is repair of lightened hair feasible? Myths and facts on hair-bonding treatments." Blond hair is a never-ending trend, and is one of the most desired hair colours and a status symbol. The bleaching agent hydrogen peroxide destroys melanin pigments and damages the hair structure by oxidation of amino acids from cysteine to cysteic acid . The damage results in hair that is rough, straw-like, dull, lifeless and prone to breakage.

With bright blond or even white hair colours becoming fashionable over time, prevention or even repair of hair damage by lightening has become a real consumer need. Cutting-edge research by biophysical measurements (hair breakage by combing, stress-strain measurements of E-modulus and break stress), as well as by differential scanning calorimetry (DSC) of structural changes in keratin caused by strong oxidative stress, has led to several approaches to counteracting this oxidative keratin damage using ingredients that can bond with neighbouring keratin strands.

Stress-strain measurements using maleic acid and succinic acid showed significantly less E-modulus reduction, and significantly higher break stress values (**Fig. 6**). By comparison, the damage was substantially greater with acetic acid.

The results of wet-DSC with maleic acid indicated significantly stronger crosslinking of α-helices with surrounding matrix at significantly higher denaturation temperatures. A trend towards higher denaturation enthalpy indicates stabilisation of α-helices (**Fig. 7**).

Intercalation of the acids into the hair structure and bridging of neighbouring keratin strands by ionic and/or hydrogen bonds can be assumed as a hypothetical mechanism (**Fig. 8**). Hairdressers have responded very positively to these results.

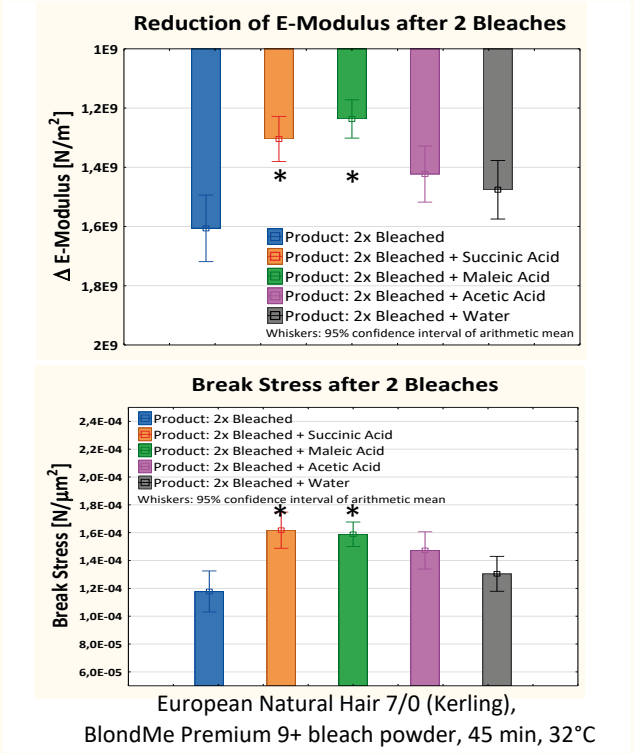


Fig. 6 Reduction of E-modulus and break stress after 2 bleaches (©Henkel)

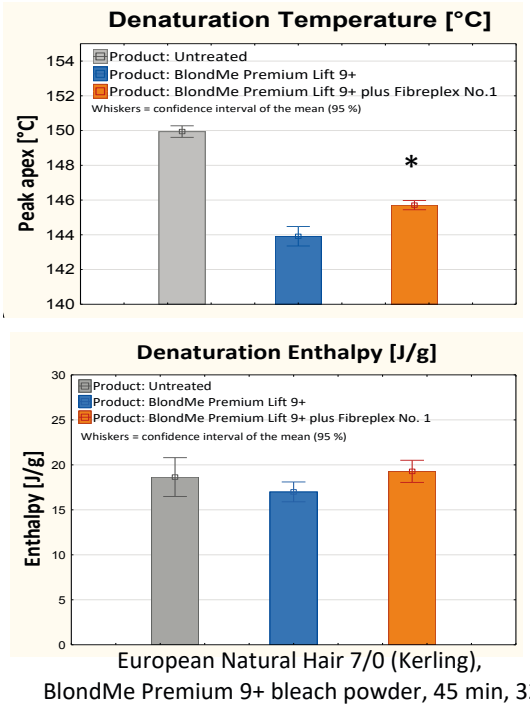


Fig. 7 Denaturation depending on temperature and enthalpy (©Henkel)

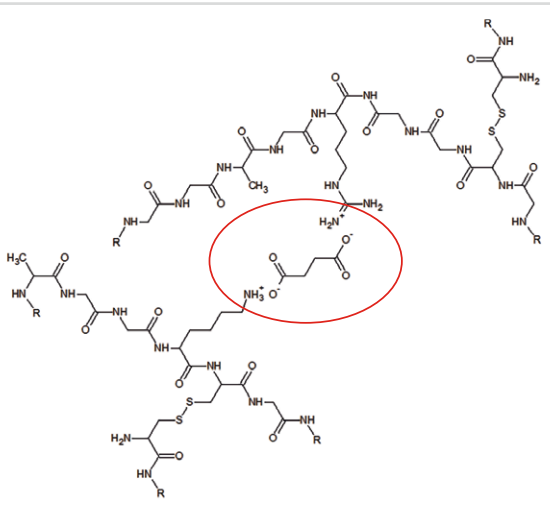


Fig. 8 Hypotheses of intercalation of dicarboxylic acids into the hair structure and bridging of neighbouring keratin strands by ionic and/or hydrogen bonds (©Henkel)

Young Researchers' Award of the GDCh Specialist Group Detergency and Formulations

The **Young Researchers' Prize** was awarded to ***Dr. Viet Hildebrand*** for his innovative work in the field of "Responsive Materials," which uses systematic variation of structures to characterize a number of series of new poly zwitterions. Thereby, new amphiphilic structures and polymeric surfactants with exceptional properties become accessible . By realising so-called "schizophrenic" aggregation behavior, this research obtained a group of switchable polymeric surfactants, thereby opening up innovative approaches for the development of new components in detergents.

Dr. Viet Hildebrand, Universität Potsdam, Institut für Chemie, 14476 Potsdam, Germany, reported on his research work on "Twofold switchable block copolymers based on new polyzwitterions."

As a complement to the well-established zwitterionic monomers 3-[(2-(methacryloyloxy)ethyl)dimethylammonio]propane-1-sulfonate ("SPE") and 3-[(3-methacrylamidopropyl)dimethylammonio]propane-1-sulfonate ("SPP"), the closely related sulfobetaine monomers were synthesised and polymerised by reversible addition-fragmentation chain transfer (RAFT) polymerisation, using a fluorophore-labelled RAFT agent. The polyzwitterions of systematically varied molar mass were characterised with respect to their solubility in water, deuterated water, and aqueous salt solutions. These poly(sulfobetaine)s show thermos-responsive behavior in water, exhibiting upper critical solution temperatures (UCST). Phase transition temperatures depend notably on the molar mass and polymer concentration, and are much higher in D_2O than in H_2O. In addition, the phase transition temperatures are effectively modulated by the addition of salts. The individual effects can be partially correlated to the *Hofmeister* series for the anions studied. Nevertheless, they depend in a complex way on the concentration and nature of the added electrolytes, on the one hand, and on the detailed structure of the zwitterionic side chain, on the other hand. For the polymers with the same zwitterionic side chain, it was found that methacrylamide-based poly(sulfobetaine)s exhibit higher UCST-type transition temperatures than their methacrylate analogues. The extension of the distance between polymerisable unit and zwitterionic groups from 2 to 3 methylene units decreases the UCST-type transition temperatures. Poly(sulfobetaine)s derived from aliphatic esters show higher UCST-type transition temperatures than their analogues featuring cyclic ammonium cations. The UCST-type transition temperatures increase markedly with spacer length separating the cationic and anionic moieties from 3 to 4 methylene units. Thus, apparently small variations in their chemical structure strongly affect the phase behaviour of the polyzwitterions in specific aqueous environments.

Water-soluble block copolymers were prepared from the zwitterionic monomers and the non-ionic monomer N-isopropylmethacrylamide ("NIPMAM") by the RAFT polymerisation. Such block copolymers with two hydrophilic blocks exhibit twofold thermo-responsive behaviour in water. The poly(sulfobetaine) block shows a UCST, whereas the poly(NIPMAM) block exhibits a lower critical solution temperature (LCST). This constellation induces a structure inversion of the solvophobic aggregate, called "schizophrenic micelle." Depending on the relative positions of the two different phase transitions, the block copolymer passes through a molecularly dissolved or an insoluble intermediate regime, which can be modulated by the polymer concentration or by the addition of salt. Whereas at low temperature, the poly(sulfobetaine) block forms polar aggregates that are kept in solution by the poly(NIPMAM) block, at high temperature, the poly(NIPMAM) block forms hydrophobic aggregates that are kept in solution by the poly(sulfobetaine) block. Thus, aggregates can be prepared in water, which switch reversibly from the "inside" to the "outside", and vice versa.

(Photos: *K. Heyer*)

Fragrances and Perfumes

Opening of the Scientific Conference DGP by the chair, Dr. Wolfgang Krause

The **German Society of Perfumers (DGP)** presented an interactive show of fragrances and perfumes entitled "Bridge of Senses,", shared treasures from the Osmothèque in Versailles and revealed new paths in perfumery.

Discovery of Osmothèque's Treasure

Patricia de Nicolai, Osmothèque of Versailles, provided an insight into the world's largest perfume archive, which hosts a prestigious and growing collection of more than 3,500 perfumes. This includes 400 defunct fragrances that have disappeared from the market but have paved the way for modern perfumery. Inspired by the idea of saving perfumes from oblivion, some perfumers and fragrance houses have entrusted their secret formulas or perfumes to the Osmothèque. Famous example of these perfumes are *Ambre Antique* (1905), *Le Chypre* (1917) and *Crêpe de Chine* (1925).
Furthermore, professional perfumers from the Osmothèque try to recreate these precious scents, closely following the know-how and the sourcing of the original raw ingredients. Exemplars of successful recreations of disappeared scents and perfumes respectively are Le Parfum Royal (1st Century), Napoleon's Eau de Cologne on St. Helena Island, Fougère Royal by Houbigant, Les Parfums de Rosine by *Paul Poiret*, Coty, Lubin, Piver, Weil, Patou and others.

Slow Retail – New Paths in the Perfumery Sector

In 2009, ***Stefanie Hanssen*** and ***Christoph Niedermeier*** founded FRAU TONIS PARFUM in Berlin. They offer only hand-crafted perfumes, which belong to the luxury segment of so-called "niche perfumes". The elegant simplicity of the bottles and the spartan Bauhaus-inspired packaging reflect their philosophy that "less is more." Their customers consciously buy luxury in the shape of "understatement."
With their purist Berlin-based "Workshop of Fragrances," the owners have created a unique oasis of peace and tranquillity, where perfume aficionados can be inspired by their fragrances. A visit there is like "a poetic stroll through the sensual undergrowth of their own past."
In our fast-paced times, individual and personal contact unfortunately are all too often lost. Since the start of the new decade, however, retailing and consumer behaviour have been changing, moving away from the impersonal and the uniform to the unique, the curated to hand-crafted products. The concept of "slow retailing" has also entered the cosmetics sector. At FRAU TONIS PARFUM, the focus is on a conscious sensory shopping experience. Each of the perfumes on offer has its own history, the customer enters into an intensive dialogue with perfume experts and discusses experiences and associations. "Fragrance as inspiration" is the company's ethos.
The fragrance range includes the wonderfully close-to-nature "Linde Berlin," the sparklingly invigorating "Berlin Summer" and the eccentric "Veilchen," which inspired the legendary Marlene Dietrich way back in the 1920s. The fragrance "No. 21 Berlin" pays olfactory homage to the exciting city of Berlin: modern, lively and creative.

(Photos: *K. Heyer*)

SEPAWA Takes Off

Dr. Ulf Merbold took us on a voyage into space. The keynote lecture took the audience into other spheres. *Dr. Merbold* is a physicist and a former astronaut. He took part in the 1983 maiden voyage of the European Space Lab and, together with his five US colleagues, absolved a great number of experiments on board. His topic was on: "Science in Space – Impressions for Earth and Climate".
He talked about his emotions at the point of launch and about how it felt to be „caught" in space. He particularly emphasized the Earth's beauty and its fragility. Using images from space, he showed just how important it is to preserve this one Earth for generations to come.

Be Careful When You Move!

In her lecture, *Antoinette Anderegg* showed us how we can interpret nonverbal signals of body language and use them in daily life, be it within a team, in a sales situation or during negotiations. The topic: "Body language – nonverbal indicators of deception".

Ms. Anderegg explained how our body language subtly shows our emotions, expectations and intentions to act. The way we dress can also be seen as a communication signal. Using pictures and videos, she demonstrated how, through mimic, body movement and looks, people „reveal" their true attitude.

(Photos: *K. Heyer*)

SEPAWA After Event

The Congress's Highlight

This year, the SEPAWA After Event Team once again hosted an evening featuring Star Cuisine and first-class entertainment in an atmospheric ambience for its guests.
For the first time in the Estrel with its over 800 seats, TV Chef *Stefan Marquardt*, the Estrel's Head Chef *Peter Griebl* and the Esperanto's Chef *Andreas Scholz*, supported by their team of almost 50 chefs, accomplished a top culinary performance. *Carlos Zaspel*, Super Talent Finalist of 2016, performed twist upon on his „Spinning Pole" which he had developed himself, and with a combination of Street, Break and Pole Dance, the *Da F.U.N.K dance studio's* Master Crew rocked the house.
Markus Schmid and his band along with *Betina Ignacio* entertained with Latin American Jazz and Swing.
After the meal, people took to the dance floor to work off the recently acquired calories.

So again, it was a successful evening which provided a feast for all senses!

(Photos: *K. Heyer*)

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