

2016 Innovations

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Almost every new ingredient offered to the cosmetic industry is described as innovative and probably more than 100 new materials have been described by the author over the last twelve months. The functions of cosmetics are defined by EU Cosmetics Regulation 1223/2009, which are to clean; perfume; change appearance, correct body odour and to protect and keep in good condition. This feature will review new and innovative introductions for each of these categories

To Clean:

Personal cleansing usually involves the use of surfactants and there is a continual movement away from traditional ethoxylated and sulphated materials towards milder ones and preferably to those able to make natural claims. These were featured in SPC February 2016 “From Lab to Bath” that presented various surfactants based on olive oil as well as the more traditional alternatives. Also described were protein-based surfactants such as Amaranth S [INCI: Sodium cocoyl hydrolyzed amaranth protein] from **Lonza** and Proteol APL [Sodium cocyl apple amino acids] from **Seppic**. **Greentech** combined the amino acid lysine with natural oils to create its Aquasiloils range of water-soluble oils for face and body washes and **Ichimaru Pharcos** promoted Soapnut Extract Powder [INCI: Sapindus trifoliatus fruit extract] as a truly natural surfactant for personal cleansing products.

To Perfume:

Perfumes have been very much under scrutiny in recent years because of the requirement to disclose potential allergens. Knowing little about perfume compounding the author can only offer delivery systems as examples of innovative advances in perfumery. One such is described in Patent USP 6,555,098 that claims deodorant and deodorant-antiperspirant cosmetic stick and roll-on products with an organic matrix having a dispersed phase of discrete particles of an encapsulated bicarbonate salt and of an encapsulated fragrance compound. The particle surfaces are coated with maltodextrin starch so that when the product is applied to underarm surfaces, the deodorizing activity is signalled by the release of a fragrance aroma.

Formulators creating water-based products for the “natural” market need to solubilise perfumes without the use of ethoxylated surfactants. **Croda** suggests NatraGem S140 NP [INCI: Polyglyceryl-4 laurate/sebacate, polyglyceryl-4 caprylate/caprinate, aqua], as a high performance solubiliser designed to incorporate essential oils, perfume ingredients and a wide range of lipophilic cosmetic

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actives and their carrier oils into clear formulations. It is 100% naturally derived and has proven counter irritancy benefits so can be used on the most sensitive of skin types.

Changing appearance:

Changing appearance cosmetically is usually taken to mean adding decorative make-up although it could include skin lightening, wrinkle reduction and enhancing skin tone and it may also include hair colouring and styling. At In-cosmetics 2016, **BASF** launched a range of complementary pigment technologies based on sustainably sourced natural mica, synthetic mica and borosilicate. Flamenco Summit Aqua is a natural mica with a unique blue shade and intense brightness from frosted white to deep digital blue. With its small particle size, it is claimed to provide excellent coverage and a fine, satin appearance in make-up and skin care applications. Also introduced by **BASF** was Reflecks Dimensions Brilliant Gold, a new borosilicate with an intense gold hue, offering a strong sparkling effect.

Sensient Cosmetic Technologies recently added Arianor Magenta to its range of cationic dyes for permanent and semi-permanent hair colouring and Covaline Triple Black for intense black eyeshadows. TagraCap Colours from **Tagra Biotechnologies Ltd** are derived from iron oxides, chromium oxides and ammonium ferrocyanide. Tagra RND Microencapsulation Technology is used to micro-cap each pigment separately so isolating non-water soluble pigments to give an appearance of white free-flowing powders that release their colour when applied to the skin.

Hair colouring frequently starts with hair bleaching, which is a potentially destructive chemical process, and two materials were launched this year that are claimed to mitigate the deleterious effects. GoBlond [INCI: Aqua, Linum usitatissimum (linseed) seed extract, polyquaternium-7, sericin, fibroin, guar hydroxypropyltrimonium chloride, hydroxypropyl starch phosphate] from **Chemyunion** is said to provide active protection of the hair fibre during the bleaching process for improved smoothness, strength and shine. Active Lite Hair from **Active Concepts** [INCI: Polyquaternium-80, hydrolysed pea protein, Selaginella lepidophylla extract] is said to provide a bio film of proteins, amino acids and polysaccharides that creates a supporting interwoven matrix. It is added to the bleach solution prior to application and it results in smooth, stronger hair.

There have been a number of new styling polymers introduced in the past twelve months: RevCare from **Revolymmer** [INCI: Sodium itaconate] is a water-soluble polymer that can be incorporated in alcohol-free sprays and gels to provide a weather-resistant strong hold for 48 hours. **Covestro** launched Baycusan C 1010 [INCI: Polyurethane-34] that forms a flexible and elastic film around the hair to provide lasting curl retention and **Croda** launched MiruStyle MFP PE [INCI: hydroxypropyltrimonium hydrolyzed corn starch] to deliver outstanding style retention benefits without dulling or altering the feel of the hair. Other new polymers from **Croda** are MiruStyle X-HP

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[Laureth-40 maleate/styrene sulfonate copolymer] and Mirustyle X-HV [Sodium methoxy PEG-16 maleate/styrene sulfonate copolymer] and both are designed to provide defence against the intense heat generated by modern styling appliances.

Replacing oils and solvents in make-up preparations with water appeals to both consumers and company accountants. **Lubrizol** described a water-based lipstick formulation with matte finish on lips without dryness. It is stabilised with Avalure Flex-6 polymer [INCI: Polyurethane-62, trideceth-6] that also enables the use of water-soluble active ingredients such as peptides and marine ingredients to be incorporated in the product. **Sensient** supplies a number of mineral and inorganic pigments pre-dispersed in a water/glycerin mixture under its Covarine trade name. These semi-fluid pastes are suitable for water-based make-up including solvent-free nail polish.

Correcting Body Odour:

Traditionally correcting body odour has been achieved by including antimicrobials in personal cleansing products, the most commonly used being triclosan and triclocarban, or by the use of aluminium salts in antiperspirants. Triclosan and triclocarban have been blamed for various ills by consumer groups, based on internet scare stories rather than proven fact, but it has resulted in the two materials being deleted from the majority of soaps, body washes and shower gels. There seems to be little to take their place so many antimicrobial claims have also been dropped. A recent survey found that sodium benzoate, salicylic acid and benzethonium chloride were the most common substitutes.

At In-cosmetics 2016 **Zemea** described the formulation of clear, natural deodorant sticks based around its propanediol. A clear stick containing 0.5% perfume using 45% **Zemea** propanediol, 0.95% sodium hydroxide, 6% stearic acid and 8% polyglyceryl-10 caprylate/caprate with the balance being water was shown that had deodorising properties without the use of triclosan. A clear antiperspirant roll-on comprising 15% aluminium chlorhydrate, 5% polyglyceryl-10 caprylate/caprate, 0.5% perfume, 69.5% water and 10% propanediol was also described.

A presentation on behalf of **Schill+Seilacher** described the use of zinc ricinolate to absorb malodours including those in human sweat. It is a constituent of cosmetic grade Polyfix [INCI: Zinc ricinoleate, aqua, tetrasodium glutamate diacetate, propanediol] The mechanism is believed to be covalent bonding between the zinc molecules and carboxyl and hydroxyl groups in perspiration and it does inhibit natural transpiration nor interfere with the natural bacterial flora of the skin.

The skin's microbiome comprises both resident and transient pathogenic bacteria and commensal bacteria that protect the host against pathogens. Ideally cosmetic biocides would prevent microbial

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growth without affecting the skin's natural microbiome so that "good" bacteria help defend the organism against "bad" bacteria. **Active Micro Technologies (AMT)** has developed antimicrobial peptides obtained through fermentation technology that are designed to promote histone deacetylase (HDAC) activity and maintain the commensal bacterial balance. HDACs are a class of enzymes expressed in skin cells that help maintain healthy skin and HDAC3 is essential in regulating the relationship between commensal bacteria and cell function. It is claimed that peptide technology eliminates pathogenic microbes while maintaining skin's protective microflora balance and Leucidal Liquid SF [INCI: Lactobacillus ferment] from **AMT** can be used as a replacement for triclosan and triclocarban and also finds use as a cosmetic preservative.

A similar mechanism of protecting the "good" while controlling the "bad" is claimed for FluidPure 8G from **Seppic**. It comprises capryloyl glycine, xylitylglucoside and hexylene glycol and is added to shampoo to reduce the proliferation of the yeast *Malassezia furfur*, responsible for dandruff. It also controls production of the enzyme 5- α -reductase responsible for over-activity of sebaceous glands and it helps restore the normal pH of the skin acid mantle. This supports the natural skin and scalp microflora that have a symbiotic relationship to help maintain a healthy skin appearance.

Regulating *Malassezia* proliferation while preserving the scalp microbiota ecosystem is also the claim made by **Lucas Meyer** for its Defenscalp [INCI: Aqua, *Epilobium angustifolium* flower/ leaf/ stem extract]. It is a multifunctional plant-derived ingredient suggested as a scalp-friendly alternative to classical anti-dandruff ingredients. It is said to normalise sebum, reinforce corneocyte cohesion and modulate the scalp immuno-inflammatory defence system to maintain healthy flake free non-oily looking scalp and hair.

To protect and keep in good condition:

Protection from solar radiation is an essential requirement if skin is to remain in good condition. This was the subject of Protection: From Top to Toe in the April edition of SPC. That was written before In-Cosmetics 2016 at which **BASF Beauty Creations** launched Lys'Sun, which was shortlisted for a functional ingredient award. An enzyme called LOX-L is fundamental to the synthesis and cross-linking of elastin fibres that make up the bulk of the dermis, however UV light triggers a response that upsets this process resulting in an accumulation of non-functional elastin, which groups together in aggregates and cannot be naturally removed. The skin loses its elasticity and becomes loose, lines deepen and run together: this is known as solar elastosis. Lys'Sun [INCI: Hamamelis Virginia (Witch hazel) leaf extract, aqua, pentylene glycol, caprylyl glycol, xanthan gum] stimulates LOX-L synthesis and **BASF** claims it to be the first active ingredient that corrects solar elastosis damage and to act as a powerful shield against photo-aging.

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Two trends in skin care that have come to the fore over the last twelve months are protection against stress and environmental pollution. **Givaudan** won the Gold Award at In-Cosmetics 2016 for its Neurophroline [INCI: Tephrosia purpurea seed extract] active ingredient claimed to protect the skin against the effects of mental stress. According to Givaudan stress releases hormones that affect the skin causing visible signs such as circles under the eyes and a fatigued appearance or fine lines. A specific extraction from the seeds of the wild indigo, Tephrosia purpurea, a native Indian plant used in the Ayurvedic tradition for its benefits on skin, is used to obtain a condensate enriched in specific sugars including stachyose and ciceritol. This releases beta-endorphins within the skin while combatting the stress hormone, cortisol. Neurophroline is claimed to provide a better skin radiance under the eyes, recovery of the skin luminosity and improvement of skin colour.

Protective films to support and improve the natural barrier function of the skin come under the heading of protect and keep in good condition. Environmental pollution in crowded cities comprises nitrous oxide, polycyclic aromatic hydrocarbons, volatile organic components and particulates plus heavy metals, sulphur dioxide and carbon monoxide. Phyco AP is a polysaccharide anti-pollution ingredient [INCI: Aqua, hydrolysed algin] from **Codif** formed from depolymerised alginates to obtain an oligoalginate of high molecular weight. It can be applied on human skin, where it remains on the surface to form an invisible mask throughout the day to prevent pollutants from reaching the skin and renders them easy to remove by normal cleansing. In particular it protects skin against the adhesion of fine particles, heavy metals and cigarette smoke and preserves cellular viability and skin cohesion.

Silab claims Filmexel as an innovative and multifunctional natural film-forming active ingredient that forms a resistant, flexible and non-occlusive film on the skin surface. Filmexel [INCI: Kappaphycus alvarezii extract, Caesalpinia spinosa fruit extract] is composed of an interpenetrating network of two polysaccharides and these natural biopolymers form a resistant, flexible and non-occlusive film on the skin, mimicking its properties and functions. As a second skin, it exerts a barrier effect against pollutants, irritants and allergens and preserves the natural barrier function. It also smooths the micro-relief of the skin and improves its biomechanical properties. This effect is almost instant and lasts for about 2 hours and it can also be used under make-up to improve its application and durability.

Citystem from **Sederma-Croda** is also targeted at providing protection from environmental pollution. It is a new natural active ingredient designed to fight against visible and invisible pollution damage to the skin with proven results including protection of skin cells from the penetration of pollutants, removal and neutralisation of toxic oxidant species, strengthening of the skin barrier and repair of

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cell metabolism. It is also claimed to refine skin grain so that the complexion looks radiant and purified and skin feels soft and smooth. An instant overall improvement of skin appearance was observed in a study with 100 volunteers after only one application of a cosmetic containing Citystem for 10-15 minutes.

Hair is also subjected to environmental pollution. When hair is exposed to everyday aggressors, such as sunlight, pollutants, chemical treatments or excessive heat, the hair can become coarse, brittle and more vulnerable to split ends. Silsoft CLX-E from **Momentive** is a cross-linkable silicone conditioning agent [INCI: Dipropylene glycol, polysilicone-29] that can help hair care products combat these aggressors and restore damaged hair to its original hydrophobic state. It is also claimed to repair split-ends and cuticle damage and to provide improved thermal protection and better overall conditioning on chemically relaxed hair. Silsoft CLX-E is water dispersible and can provide improved manageability and a soft, radiant appearance with effects so durable, they last through multiple washes, claims **Momentive**.

Reducing areas of hyperpigmentation and improving skin radiance is the claim made for Organic Bright Oleoactif from **Oleos**. It is an oil soluble active derived from marshmallow, rice bran and liquorice. Bright Oléoactif acts on 4 key stages of the cutaneous pigmentation process: the inhibition of endothelin-1 synthesis in keratinocytes, which inhibits melanocyte differentiation, the activation of the intracellular signal transduction pathway, a dose-dependent inhibition of the tyrosinase enzyme and the inhibition of the coloration of pre-existing melanin pigments. Test results show that it increases skin radiance and provides a statistically significant increase of the brightness of the skin and reduction of dark spots.

Codif reports that dark spots can be pollution induced by causing inflammation and an increase in the pro-inflammatory enzyme COX2 in the epidermis, however COX2 activates prostaglandins, known for stimulating melanogenesis, resulting in areas of pigmentation. EPS White is a saccharide Isomerate comprising serine and alanine. These two hydrophobic amino acids induce folding of the molecule in the form of microvesicles that can penetrate the skin to interact with the pigmentary synapses and reduce pigment formation by 35%.

The silver award for innovative active ingredients went to **IFF-Lucas Meyer** for Miniporyl, which is an extract of red clover that reduces the appearance of conspicuous and unsightly enlarged pores with a complete mechanism of action to rapidly recover a refined high definition skin. According to **Lucas Meyer** pore enlargement is linked to an incomplete keratinocyte differentiation, characterised by the retention of nuclei in corneocytes that prevents the normal desquamation process. These dead cells clog the orifice leading to a mechanical pore dilation. This is amplified with oily skin and acne

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prone skin since the pore has to expand to accommodate the outpouring of excess sebum. Also, loss of skin firmness and tonicity induces tissue relaxation and collapse of pore wall, which leads to a larger pore opening. Miniporyl [INCI: Isopentyldiol, Trifolium pratense (Clover) flower extract] is claimed to improve keratinisation, regulate sebum production and to add tonicity to skin, all of which contribute to a significant reduction in pore size shown by subjects using a cream containing 2% Miniporyl over a period of 30 days.

Keeping skin moisturised is the prime requirement for keeping it in good condition but, although there are many ways of improving skin moisture content, effects seldom last for more than a few hours. Claiming to improve skin moisture content for 30 hours or more is Elfamoist AC [INCI: N-acetyl DGA] from **AkzoNoble**. Because of its small molecular size, it can penetrate the stratum corneum and bind water molecules to the skin by interaction between them and keratin, thus improving skin hydration. It is said to be provide lubricity in skin feel without stickiness or affecting the skin's natural barrier properties.

Finally, an innovative anti-aging concept was presented at the IFSCC Conference 2015 by Durant Scholz, **Active Concepts**. Certain sulphur-rich compounds play essential roles in combating signs and symptoms of aging via upregulation of glutathione, a peptide containing glutamic acid, cysteine, and glycine residues. Over time, concentrations of glutathione decrease within the epidermis due to a shift in the redox reaction rate, favouring oxidation. Intracellular glutathione combats inflammation and slows the effects of aging via DNA, protein, and lipid synthesis and enzyme and amino acid transport regulation. Research by **Active Concepts** showed that glutathione concentrations may be increased by topical application of a small chain peptide and that that higher glutathione levels are capable of inducing cytostasis in keratinocytes, offering a novel anti-aging pathway. This led to the introduction of CytoSulf PF [INCI: Plankton extract, Leuconostoc/radish root ferment filtrate] that is capable of suspending cells in a semi-permanent, drawn out stage of rest, preventing them from aging!

Please note that INCI breakdowns only show the principal ingredients and those interested are advised to contact the supplier for complete information.

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