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Abstracts

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Development of a Water-Resistant and Detergent-Washable Powder Coated with a Stimuli-Responsive Polymer and its Application to Suncare Products

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It is generally well known that the surface of an inorganic UV-protective powder used in a sunscreen formula is treated with a fatty acid or other hydrophobic chemicals to obtain a high water resistance. Due to the resulting strongly hydrophobic surface, the treatment has a clear drawback in that it allows the sunscreen to leave its base components on the skin after washing with regular soap. Therefore, in this study to develop an intelligent sunscreen formula that has a high water resistance and can be washed away easily with regular soap, we focused on a pH-responsive polymer as the surface-treatment agent for a UV-protective powder. Numerous experiments led to the synthesis of the 2-acrylamido-2-methyl-1- propanesulfonic acid/11-methacrylamidoundecanoic acid (AMPS/MAU) copolymer, which is hydrophobic in acidic to neutral solution and hydrophilic in basic solution. Titanium dioxide subjected to surface treatment was treated with the AMPS/MAU copolymer showed a high pH-responsiveness that was similar to that of the polymer. A W/O-type sunscreen containing the pH-responsive titanium dioxide showed a high water resistance as well as a high washability with regular soap.

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New Peptidic Active Ingredient to Reduce Discomfort and Painful Sensations in Sensitive Skin

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Approximately 40% of the population (all skin categories and phototypes) complain of sensitive skin. Sensitive skin is healthy but overresponsive, meaning it reacts faster and more intensely to several parameters including environmental factors such as temperature changes and the sun, use of cosmetic products, and certain medicines. It experiences discomfort, tingling, burning and intolerance to certain types of products, a condition referred to as neurosensitivity characterized by a lower threshold of tolerance. Currently, all of the causes are not known but an increase in the permeability of the stratum corneum and an exaggeration of the nerve response are considered to be involved in the phenomenon of sensitive skin. Lifestyle factors including tobacco, alcohol, stress, fatigue and emotions also have an effect. A new synthetic tetrapeptide, N-acetyl-L-tyrosyl-L-prolyl-L-phenylalanyl-L-phenylalaninamide (Ac-YPFF-NH2), mimicking a natural opioid peptide was developed with the aim to decrease skin nerve ending stimulation. This tetrapeptide was demonstrated in vitro to reduce cutaneous overreactivity by decreasing release of calcitonin gene-related peptide from sensory neurons via an agonist effect on the μ opioid receptors and in vivo to improve the comfort of sensitive skin by decreasing unpleasant sensations and pain induced by heat and capsaicin. This tetrapeptide targeting an exaggerated nerve response helps to relieve sensitive skin by normalizing the tolerance threshold for environmental factors or certain topically applied uncomfortable products or skincare treatments.

Paper presented as a poster at the 25th IFSCC Congress 2008, Barcelona, Spain

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Assessment of Human Stratum Corneum Thickness and its Barrier Properties by In-Vivo Confocal Raman Spectroscopy

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Measurement of water concentration profiles across living human skin by confocal Raman spectroscopy has developed into a powerful tool for a better understanding of distribution and function of water in the epidermis. From the water profile across the epidermis the border between stratum corneum and stratum granulosum can be estimated. This is due to the steep drop in water concentration from the inner to the outer side of the stratum corneum. Water content drops from approximately 70% at the inner stratum corneum to only 30% at the skin surface. This slope of the curve becomes clearly flatter in the stratum granulosum. A second parameter is usually taken from confocal Raman spectroscopy to define the stratum corneum border. This is the content of natural moisturization factor (NMF), which should be present only in the stratum corneum. Located at the depth at which the NMF content levels off and the slope of the water profile curve changes is the stratum corneum border. The goal of this work was to develop stratum corneum thickness detection into a robust and semi-automated measurement relying only on the water profile. Further, the aim was to base the empirical findings of water distribution in the epidermis on a well established theory, Fick's law of diffusion. A mathematical model was developed to fit the water profile curve for a robust and automated detection of the stratum corneum border. In addition, the new model automatically resulted in an accurately determined slope of the water concentration curve in the stratum corneum. This slope, or more exactly the gradient, is one of two parameters directly related to transepidermal water transport across the stratum corneum.

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Anti-Inflammatory Activity of Pseudopterosins by Laser Doppler Blood Flow Evaluation

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Pseudopterosins extracted from Caribbean Sea Whip (Pseudopterogorgia elisabethae) were previously shown to inhibit phospholipase A2, an enzyme that functions in the arachidonic acid cascade of inflammation. With an objective to test its in vivo anti-inflammatory potential, we conducted a screening clinical bioassay using randomized analysis on sixteen panelists. An emulsion containing 0.02% of sea whip extract was applied to the volar forearm of subjects prior to or after an ethyl nicotinate challenge. Blood flow rate at the application site monitored using a laser doppler blood flowmeter served as a measure of inflammation induced by ethyl nicotinate. Upon post-challenge treatment, sea whip extract reduced blood flow by 35.04% against untreated control and also delayed the blood flow. More pronounced reduction in blood flow, as low as 59.50%, was noted upon pretreatment. This reduction was significant ($p<0.0095$). Pretreatment caused not only a delay in onset of inflammation but also a reduction in the peak time of blood flow. This study further substantiates the previously reported in vitro anti-inflammatory effect of sea whip extract, demonstrating its activity in deep skin layers by affecting blood flow. The preventive application prior to induction of inflammation was more effective when compared to post-treatment.