

INNOVATION IN UV PROTECTION WHEN IT BECOMES A DAILY MUST HAVE

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1 INTRODUCTION

Optimizing the efficiency of solar filtration formulations is a constant objective of the cosmetics industry. In particular, it takes into account a better distribution of the filters with the lowest possible concentration of the latter, resistance of the formula to the surface of the skin to guarantee the persistence of the filters on the skin, reduce release in the environmental and ensure optimal sensoriality for increased consumer observance. For this purposes, we co-developed with raw materials suppliers a unique technology (NETLOCK™) based on an amphiphilic acrylate copolymer INCI C12-22 alkyl acrylate/hydroxyethylacrylate (AAHAcP). AAHAcP is a copolymer which structures the lipophilic phase and leads alone to oil-in-water emulsion [1].

2 MATERIALS AND METHODS

FORMULA CHARACTERIZATION

Solar formula structure were observed using Confocal Laser Scanning Microscope (CLSM). Phases staining: 1 g [sample] + 5 µL [619 + Fluorescein]. Bulk was observed between 2 microscopy cover slips separated with 250 µm-thickness double tope. Deposit is prepared on a cover slip at 25-µm thickness with a drawdown bar. Sample dried at Room Temperature during 1 hour before Image acquisition.

FORMULA DEPOSITION

Optical Coherence Tomography (OCT) was used to visualize formula distribution at the skin surface in vivo. Solar products were applied on forearm, on surfaces of 2mg/cm² with a drying time of 15 minutes.

RESISTANCE TO MIGRATION

An in vitro study using polymethyl methacrylate plates (PMMA) allowed visualizing migration properties of emulsions. After standardized deposition of sun care formulas on PMMA plates, the plates were stored at 35°C during 3 hours.

PHOTOPROTECTION EFFICACY

The Sun Protection Factor of various formulations containing or not the unique AAHAcP Technology was evaluated, following the ISO/EN24444 Cosmetics Sun Protection Test-in vivo determination of the Sun Protection Factor (SPF) (2010).

SAUNA MIGRATION TEST

The resistance of formulas to sweat and heat was evaluated in vivo. A standardized quantity (500 µL) of formula was applied on half-face with a slight massage. The volunteers were submitted to a sauna for 2 hours (temperature between 35°C and 45°C and relative humidity between 50% and 70%). The visualization of the formula at the skin surface was performed before and after the sauna, using the VISIA® from CANFIELD® imaging systems. The control of the repositioning takes place directly on data-processing screen using an overlay visualization of the images at each time of acquisition. A series of photos taken under multi-spectral imaging and analysis (white light, UV or polarized light - parallel or crossed) allow to capture visual information affecting complexion health and appearance.

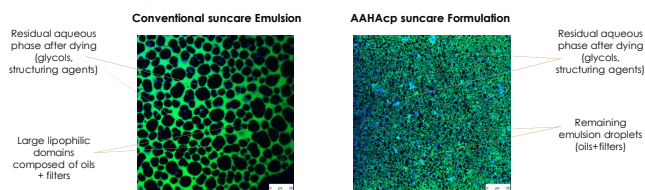
SENSORIALITY

A consumer test was realized in FRANCE on 130 women aged 20 to 60. All types of skin (face and body). Users of SPF50/50+ for body or face and body, in milk and/or cream formats. Pure monadic quantitative blind use test. Products were applied under normal conditions of use during the panelists vacations.

3 RESULTS & DISCUSSION

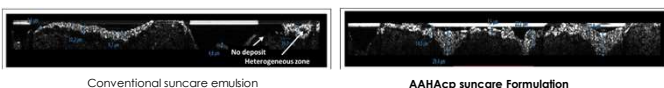
FORMULA CHARACTERIZATION

As visualized by CLSM, the new AAHAcP formulation forms finer and more regular droplets (entrapping UV filters) compared to conventional emulsions.



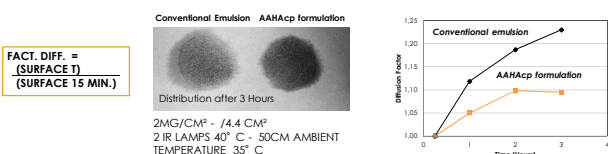
FORMULA DEPOSITION

OCT analysis shows that the films containing AAHAcP is particularly covering, and have a consequent thickness (versus the solar references tested), whatever the microrelief of the skin.



RESISTANCE TO MIGRATION

The PMMA plates test shows that the diffusion factor of the AAHAcP formula is reduced, even in hot summer conditions.



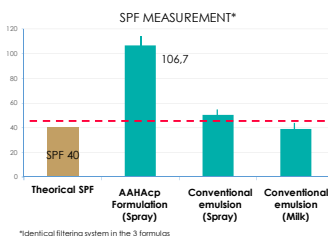
RESISTANCE TO SAUNA CONDITIONS

As shown by the dark blue zones (product visualization), even after 2 hours of sauna condition, we observe no migration of the solar formula.



PHOTOPROTECTION EFFICACY

The SPF-enhancing properties of this technology is illustrated by the comparison of three oil-in-water emulsions (sprays and lotion) containing the same association of UV filters. The AAHAcP formula yielded an SPF twice as high as the emulsions based on conventional technologies[4].



SENSORIALITY

Panelists report that the product has a very light texture, with bare skin feeling, non greasy, and letting the skin breathe. It leaves an invisible skin finish, with no white residue, even while swimming.



4 CONCLUSIONS

For the first time, thanks to a new specific polymer creating a new type of emulsion, we succeed in reconcile in a single sun care product maximal SPF efficacy, resistance to numerous stresses and optimal sensoriality.

References:

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2. Solar protection composition, containing a semicrystalline polymer, for skin and hair. European Pat., 1331000 (2003).
3. In vivo determination of the sun protection factor< (SPF). <https://www.iso.org/obp/ui/#iso:std:iso:24444:ed-1:v:1:en> (2010).
4. Moyal, D., Passeron, T., Josso M., Douezan S., Delvigne V. and Seit  S. Formulation of sunscreens for optimal efficacy. J. Cosmet. Sci. 71, 199-206 (July/August 2020).

Aknowlegements :

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