Biodegradable texturizers and benefits for next generation formulations

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Abstract
One of the sustainable development goals within United Nations 2030 agenda is to prevent and significantly reduce marine pollution. In fact, marine litter, due to several applications, is a hot-topic for NGOs that want to defend sea life. A number of Nations answer to this problem by banning plastic microbeads in cosmetics. It is an urgent need to find an available performing ingredient able to replace plastic microbeads in an eco-sustainable way.

INTRODUCTION

Non-biodegradable microplastics in cosmetic products are a cause of concern as they represent a source of seawater pollution. Every day, tons of plastic 'dust' resulting from the use of personal care products, for example microplastics with an exfoliating function for shower gels and various "rinse-off" cleansing products, are poured into Europe's seas, together with microplastics having specific technical properties used in face and body creams, sunscreens and make-up, non-rinsing, or "leave-on" products. Europe is looking into measures to limit the use of microplastics in cosmetics, already in force in some European countries, while various solutions are already available for rinse-off products. ECHA estimates that around 2000 Tons of microplastics every year goes from cosmetics to the sea. Nations are looking into measures to limit the use of microplastics in cosmetics, both at National and European levels. If solutions are already available for rinse-off product, leave-on still represents object of study.

With the intention of preserving and regenerating natural resources through innovative development, Celus-Bi® Feel is the result of a strategic partnership between ROELMI HPC and NOVAMONT, the leader in the market of biopolymers. A specific transfer of technology to cosmetic, with a number of innovative steps allowing a new patent, lead to a synergistically combination of natural derived Zea Mays Starch, Glycerin from olive oil non-edible sources and Polyvinyl Alcohol.

SUSTAINABLE BACKGROUND

CELUS-BI® FEEL results in a "readily biodegradable" texturizer in accordance with the guidelines of the Organization for Economic Co-operation and Development (OECD) and biodegrades rapidly and totally in the environment. CELUS-BI® FEEL is therefore suitable for use in applications where dispersion in water is highly likely (for example sun care products), eliminating potential pollution and/or accumulation.

CELUS-BI® FEEL also has an exceptional environmental profile, determined through the LCA (Life Cycle Assessment) method. Preliminary results (on 1 kg of material from "cradle to gate") show an average decrease in greenhouse gas emissions 75% to 95% lower than those of the range of products currently used for the same applications, while an average 60% to 75% less non-renewable energy resources are consumed than the same range of standard products.

DEVELOPMENT: EVIDENCE OF EFFICACY

CELUS-BI® FEEL shows proved performances against standard plasticizing powders and peculiar sustainable impact on the Environment. The next generation of cosmetic sensorial agents with multiple functions: texturizing, formula touch & stability, soft focus and many others.

This ethical alternative to microplastics shows extremely high level performances compared to standard texturizers used in the market, adding at the same time Sustainability for People, safety in use and after disposal with tested readily biodegrability behaviour, Sustainability in Innovation, being the valid alternative before legislative ban and Sustainability in Economy, comparable cost-in-use than traditional references.

CELUS-BI® FEEL is the result of a patented technology by synergistically combining natural Zea Mays Starch, Glycerin from olive oil non-edible sources and biodegradable Polyvinyl Alcohol. The result is a powder made of technological sensorial spheres to formulate cutting-edge leave-on cosmetics.

CELUS-BI® FEEL compatibility has been proved with a wide range of raw materials, both oil and water based. It can be used from 1 to 70% in formulation, depending on the kind of desired final product.

The application of this powder is in make-up products as foundation, blush, bronzer, eyeshadow, lipstick, mascara, while for the sun care and skin care products it can be used in emulsion and serum.

Moreover, CELUS-BI® FEEL has been tested in stability giving good results in all of the above mentioned finished products and formulas. Also CELUS-BI® FEEL technical performances have been tested, for example in compact powders: the resistance against formula breakage has been performed with successful results, showing good capacity of CELUS-BI® FEEL to enhance the compactness of powder formulations.

A number of efficacy tests have been done on the ingredient, as it is and in finished formulas as well.

It showed excellent sebum control capacity and high compatibility with active substances, vegetable oils and fragrances, acting as a carrier. Moreover, the soft-focus effect has been studied. A placebo-controlled clinical-instrumental assessment has been done, on 20 healthy female subjects aged over 18 years old. As result, skin complexion looks uniform and radiant after product application.

Sensorial characteristics too have been profiled, comparing finished formulas containing the product versus standard benchmarks in skin & sun care, make-up and toiletries, showing fascinating results.

Ongoing efficacy tests are running out to confirm the high compatibility of CELUS-BI® FEEL with the chemical UV-filters improving the spreadability leading to better performances and potentially ameliorate their safety.

CONCLUSIONS

CELUS-BI® FEEL deserves sustainability because it represents the unique of its kind readily biodegradable alternative to microplastics used in leave-on cosmetics. In fact, it is not just taking the place of a single ingredient, but it can replace several technological and sensorial profiles of different standard powders, thanks to its versatility in different formulas. CELUS-BI® FEEL is the ready-to-use innovation that can easily be formulated in leave-on cosmetics, giving the chance of a sustainable claim, with the same high profile performances of standard ingredients.

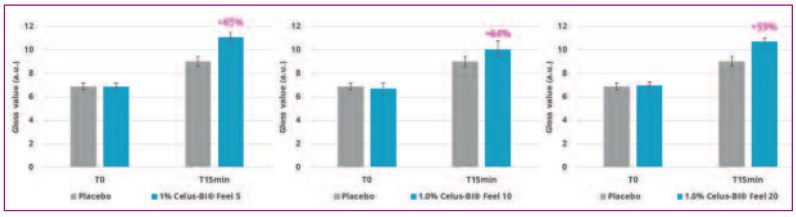

Table 1: Celus-Bi® Feel – SOFT FOCUS – SKIN RADIANCE PROTOCOL: placebo-controlled clinical-instrumental assessment of soft-focus effect on face. Each product and a placebo formulation are applied by 20 healthy Caucasian female subjects aged over 18 years old. The assessment of product effect is carried out 15 minutes after their single application, by means of non-invasive bioengineering techniques able to quantify skin brightness/radiance. The skin radiance (or skin brightness), is the ability of the skin to reflect the light and it is measured using the gloss parameter (taken using the spectrophotometer/colorimeter CM-700D, Konica-Minolta).