**ChronoSphere™ Opticals** (patent pending)
Novel Light Manipulation
Offering Anti-Aging Benefits

**Key Product Attributes:**
- Light controlling spherical powder
- Obscuring skin imperfections
- Minimizing fine lines/wrinkles
- Illusion of surface smoothness
- Luminescent appearance

**ChronoSphere™ Opticals Brite**

**INCI Name:** Silica & Polyurethane-40 & Green 5 [EU name: CI 61570]

**SAP Code #:** 139050

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- Neutralization of skin color
Introduction

It is becoming more generally recognized that skin pigmentation is controlled by two critical factors: the translucency of the stratum corneum and the color of the underlying pigment-containing skin components. The translucency of the skin allows ninety percent of white light to be transmitted through the skin’s surface where the lower epidermal and dermal layers reflect light back toward the viewer’s eye. As the reflected light travels back toward the source, it is modified by skin’s natural pigments: melanin, hemoglobin, and collagen. Each pigment reflects light at different wavelengths. Melanin reflects light in brown and yellow wavelengths, hemoglobin reflects in red and blue wavelengths, and collagen reflects in green wavelengths. The combination of these three components is responsible for the various skin pigmentations seen throughout the world. As a person ages, skin coloration may change. The appearance of aging is influenced by inconsistencies in the patterns of these three pigments as they reflect back out through the transparent stratum corneum to the eye of the observer. With today’s trends focusing on innate beauty, Lonza Personal Care is pleased to introduce our version of Maroger’s Medium: ChronoSphere™ Opticals and ChronoSphere™ Opticals Brite, clear microlens coated spheres that blend with natural pigments to build, amplify and modify the color of the skin.

Background Information

One of the best kept secrets and techniques of master painters is Maroger’s Medium. Historically, artists have used this clear resinous material to combine intense light patterns and dark shadows within a portrait to impart realistic qualities with depth. Often described as "liquid glass", the medium is blended with pigments to create a sculptured, life-like canvas with luminescent and translucent properties.

Similar to master painters, makeup artists use cosmetic formulations to alter the skin’s pigmentation and features through lightening and darkening techniques. Traditionally, cosmetic formulations have been designed to influence skin colors through a masking effect, typically achieved with opaque, colored particles that lay down on the surface of the skin and attempt to color mask the skin’s natural pigments. However, the downside of such coloring attempts is that the skin loses a sense of depth and translucency that is indicative of naturally healthy skin. This was the inspiration behind ChronoSphere™ Opticals.

Manufacturing Method

ChronoSphere™ Opticals are made by taking silica and coating the particles with clear, water-borne polymers using proprietary methods. The schematic below shows the mechanism of action for ChronoSphere™ Opticals. The clear coating on the outside of the sphere changes the angle in which light enters ChronoSphere™ Opticals. As a result, the focal point is shifted from the outer edge of the silica bead into the center thus distorting the image captured by a viewer. The modified image gives the illusion of a smoother skin surface and obscures imperfections. The clear coating on the light controlling spherical powder lacks opacifying properties thus making it “blendable” with all skin types.

Mechanism of Action

Fig. 1
ChronoSphere™ Opticals and ChronoSphere™ Opticals Brite mode of action.

ChronoSphere™ Opticals was evaluated to determine the effect of the clear lens on SPF and UV protection. An SPF 8 lotion with 5% ChronoSphere™ Opticals and a control were applied to five PMMA plates. UV transmission was measured from 290 to 400 nm using a solar simulator and spectroradiometer. The results did not show a significant difference in SPF between the two products. This indicates ChronoSphere™ Opticals will not influence SPF or UV protection.
Absorbance Spectra of SPF 8 Lotion with ChronoSphere™ Opticals (Lot# SRL2008-243) and SPF 8 Lotion Control (Lot # 2008-243)

### Absorbance Spectra

![Graph](image)

**Absorbance vs. Wavelength**

- SPF 8 Lotion with Chronosphere Opticals (Lot#SRL2008-243): Measured SPF = 8.2
- SPF 8 Lotion Control (Lot#SRL2008-243): Measured SPF = 7.8

#### ChronoSphere™ Optical — Adaptable to Every Skin Tone

The appearance of fine lines and wrinkles on the skin’s surface is a result of uneven textures. Most soft focus powders minimize these effects through a “spackling technique” in which smaller particles fill the lines while larger particles lay over the smaller particles creating an opacifying seal. ChronoSphere™ Optical, as they are clear lenses, manipulate light creating an illusion on the adjacent skin area reducing the darkness and shadows caused by fine lines and wrinkles on the skin. The clarity of the microlenses allows the product to be used on all skin tones without altering natural phenotypes. Figure 2 demonstrates the compatibility of ChronoSphere™ Optical with multiple phenotypes.

#### Control Carbopol Gel with % CO

![Fig. 3](image)

1.1 % Carbopol Gel Solutions with and without 5% ChronoSphere™ Opticals were drawn down and dried on skin tone color charts to evaluate the material’s opacifying properties. The results indicate ChronoSphere™ Optical are compatible with multiple skin phenotypes and will not modify natural skin tones or cause skin whitening effects.

### In Vivo Substantiation

![Fig. 4](image)

In vivo test results of a 3% ChronoSphere™ Optical serum before and after application in an optical illusion test. The study demonstrates the ability of ChronoSphere™ Optical to smooth out fine lines and wrinkles under the eye area.

![Fig. 5](image)

A full face study was conducted using Beau Visage, an advanced imaging system that allows the skin to be viewed 2mm below the surface where the hemoglobin, collagen and melanin components that are responsible for skin appearance and aging can be analyzed. A lotion containing 5% ChronoSphere™ Optical was applied to the participant’s entire face then pictures were taken 5 minutes later. Before and after results show the surface smoothing effects of ChronoSphere™ Optical and their ability to decrease the appearance of expression lines and deep wrinkles on the face.
ChronoSphere™ Opticals Brite — Neutralizing Skin Imperfections

ChronoSphere™ Opticals Brite is a color correcting microlens that contains a cosmetic shade adjuster that neutralizes skin imperfections and reduces redness in addition to minimizing the appearance of fine lines and wrinkles.

In Vivo Substantiation

A gel formulation containing 5% ChronoSphere™ Opticals Brite was applied to the back of a participant’s hands. The study demonstrates the ability of ChronoSphere™ Opticals Brite to instantly neutralize skin redness around the participant’s knuckle area.

Fig. 6

Before Application | After Application
---|---
Control | 9.43 | 9.53 | +1%
1st Site - 5% COB | 10.49 | 9.87 | -5.9%
2nd Site - 5% COB | 9.90 | 8.76 | -11.5%
Average [Sites 1 and 2] | 10.20 | 9.31 | -8.73%

To further demonstrate the color neutralizing properties of ChronoSphere™ Opticals Brite, a reddish-pink Behr color chart was used to model red, irritated skin. A gel cream containing 5% ChronoSphere™ Opticals Brite and a control product were drawn down on the chart. After drying, the drawdown containing ChronoSphere™ Opticals Brite (below) shows the microlens’ ability to neutralize red tones.

Fig. 8

To further demonstrate the potential of ChronoSphere™ Opticals Brite to reduce skin redness, a coated test was conducted on a participant’s volar forearm. 5% ChronoSphere™ Opticals Brite was tested in a gel emulsion versus a control. The Minolta Chromameter was used to retrieve L*a*b* readings. The results of the study showed a significant decrease in skin redness with 5% ChronoSphere™ Opticals Brite versus an increase observed in the control site where +a* measurements indicate movement toward the red direction and -a* toward the green direction.

Fig. 7

Coating integrity is maintained through homogenization.

SEM pictures were taken of ChronoSphere™ Opticals to observe the effects of high shear homogenization on the coating. The results show that the coating integrity on the ChronoSpheres™ remained intact during processing.

Fig. 9
Conclusions

ChronoSphere™ Opticals and ChronoSphere™ Opticals Brite are optical powders that manipulate light to achieve anti-aging benefits such as wrinkle and line blurring. ChronoSpheres™ provide an excellent sensorial feel to formulations. They blend with natural pigments to build, amplify, and modify the color of the skin. ChronoSphere™ Opticals are adaptable to every skin phenotype and will not cause whitening or opacifying effects. ChronoSphere™ Opticals Brite neutralize skin imperfections related to redness and minor flaws.

Formulating Tips

- **Recommended Use Level:** 1 - 10%
- **Temperature stable**
- **pH stable between 4 and 10**
- Incorporation in an emulsion may show an increase in pH over time which can be compensated with the use of a pH adjuster when formulating.
- Higher usage levels may lower viscosity requiring modifications to thickener systems.
- ChronoSpheres™ can be incorporated into the oil phase or post-emulsification using homogenization or blade mixing.