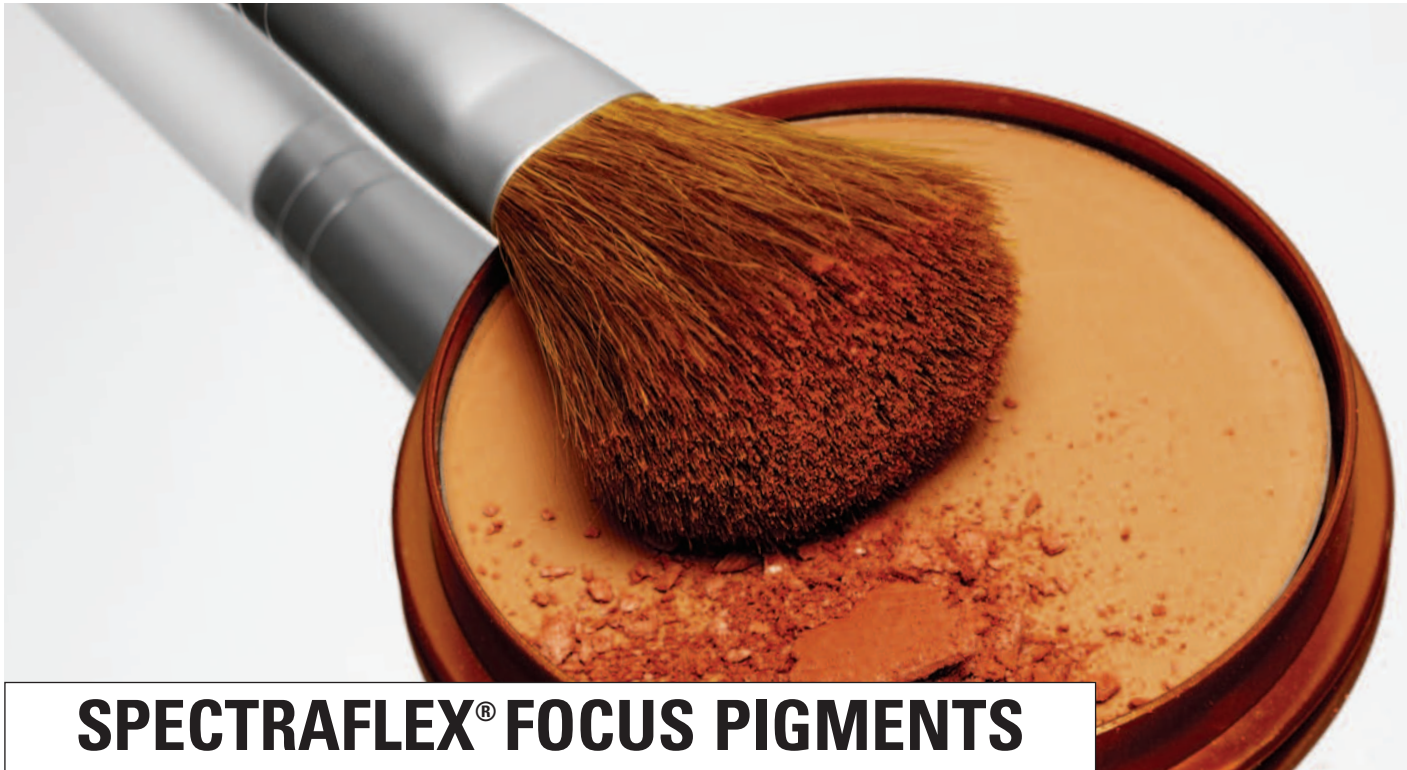


# SunChemical®

Performance Pigments®



## SPECTRAFLEX® FOCUS PIGMENTS

SOFT FOCUS AND IRIDESCENT EFFECT PIGMENTS

COATINGS  
COSMETICS  
INKS  
PLASTICS  
SPECIALTIES

*Solutions.* Tailor-Made.™

### SPECTRAFLEX® – SOPHISTICATED SOFT FOCUS EFFECTS

Sun Chemical Performance Pigments has provided its cosmetics customers with top quality products in reliable supply for over 60 years. Committed to providing Solutions Tailor-Made, Performance Pigments enhances its cosmetic offerings with a new line of soft focus effect pigments. These products provide cosmetic formulators with the resources for innovative product development and expansion.

The U.S. Food and Drug Administration (FDA) have listed alumina (dried aluminum oxide) with not less than 50%  $Al_2O_3$  as a color additive that is exempt from certification. Aluminum oxide is listed in the British Pharmacopeia as dried aluminum hydroxide which contains 47-60% of  $Al_2O_3$ . Its uses and functions are also documented under the CTFA dictionary under CAS No. 1344-28-1 and EINECS No. 215-691-6 as follows:

#### SPECTRAFLEX FOCUS PIGMENTS

The SpectraFlex Focus pigments consist of platelets of transparent alumina coated with a thin layer of titanium dioxide. They are available in a wide portfolio of interference color effects ranging from opalescent white to intense iridescents providing a desirable translucence and low luster appearance. The crystalline highly pure grade of alumina (Figures 1 and 2) is specifically designed to achieve soft focus effects with a natural translucent finish.

- Opacifier
- Drying agent
- Viscosity controlling agent
- Color additive (exempt from certification)
- Color additive in form of aluminum lakes for drug and cosmetic use

Aluminum oxide is approved in Japan under JCIC 100457– CLS categories 1-11.

#### ALUMINA

Alumina, or aluminum oxide, has been used for decades in drugs, cosmetics, foods and biomaterial applications. It is registered under the Chemical Name Aluminum (III) oxide with the INCI Name Alumina. It corresponds to the Chemical Formula  $Al_2O_3$ .

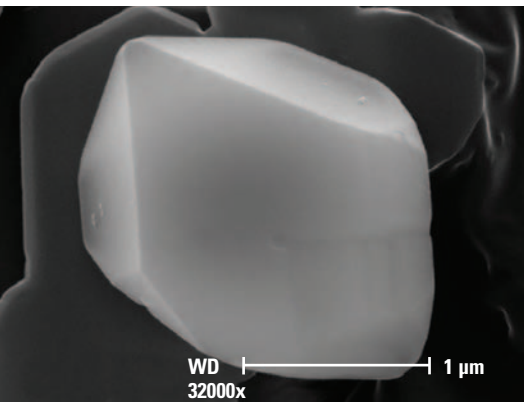


Figure 1

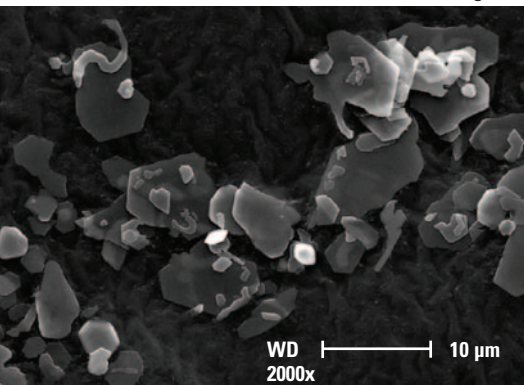


Figure 2

Product Name	Product Code	Chemical Composition (%)		Particle Size Range
		Alumina	TiO <sub>2</sub>	
SpectraFlex Focus White	C88-1001	74-84	16-26	3-18 μm
SpectraFlex Focus Gold	C88-1011	63-73	27-37	3-18 μm
SpectraFlex Focus Red	C88-1031	56-66	34-44	3-18 μm
SpectraFlex Focus Violet	C88-1041	54-64	36-46	3-18 μm
SpectraFlex Focus Blue	C88-1051	49-59	41-51	3-18 μm
SpectraFlex Focus Green	C88-1061	42-52	48-58	3-18 μm

### PRINCIPLE OF SOFT FOCUS EFFECTS IN COSMETICS

Skin surface imperfections such as fine lines and wrinkles cause the skin to appear uneven by trapping light in the micro crevices formed by the wrinkles. The trapped light is then absorbed and generates dark spots that will appear at the surface of the skin.

Soft Focus cosmetics' function is to diminish the appearance of fine lines and wrinkles by ensuring that light diffusion is uniformly distributed on the skin surface. Wrinkles and fine lines are then masked due to the soft focus effect which negates the skin's imperfections by remaining fairly translucent across the skin surface resulting in natural skin-tone look, free of blemishes. Such a performance is usually achieved using pigment particles that will interact with light as described. (Figure 3)

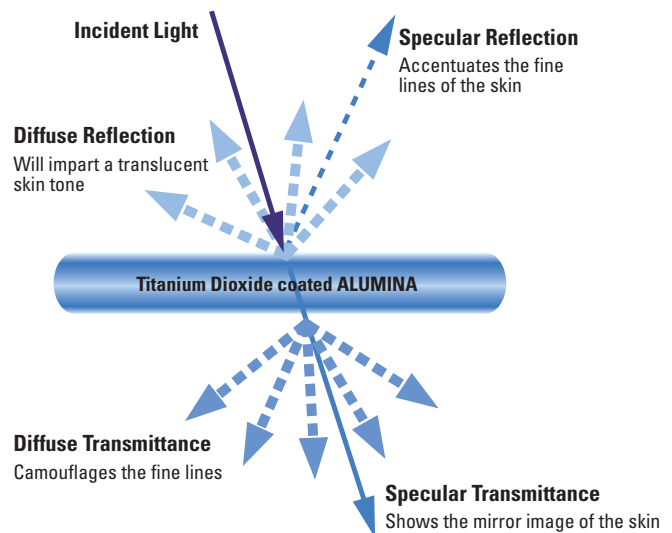
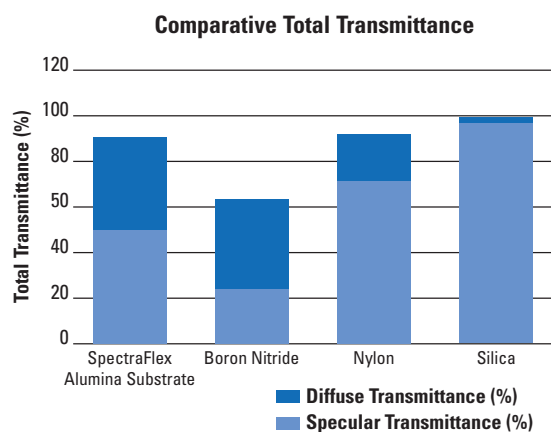


Figure 3

### Soft Focus Particles Exhibit the Following Properties

- High total light transmittance to deliver a natural appearance
- Transmitted light in a diffused form to provide an even reflection of light off of the skin
- Scattered or diffused reflective component of the total reflection at a maximum, to form an even, translucent light distribution, independent of the skin surface imperfections
- Specular reflection minimized to yield lower luster on skin surface, thereby concealing skin blemishes

### SPECTRAFLEX SOFT FOCUS PROPERTIES



Measurements done using a spectrophotometer with 0.34% wt. samples in octyl stearate with an optical path length of 1mm

Figure 4

The table (Figure 4) shows alumina used as a substrate in making the SpectraFlex has a superior combination of diffuse and total transmittance providing a more subtle and natural soft focus effect.

Once coated with a thin layer of titanium dioxide, to form the SpectraFlex Focus pigments, the resultant effect is a unique sophisticated combination of natural soft focus with an illuminating strong interference of low luster iridescence.

SpectraFlex Focus pigments enable formulators to develop bi-functional make-up and skincare products with high wrinkle concealing and skin enhancing effect, providing a natural translucent skin tone.



SunPEARL™  
Fine White

SpectraFlex®  
Focus White

SunSHINE®  
Fine White

(10% pigment in castor oil)

Figure 5

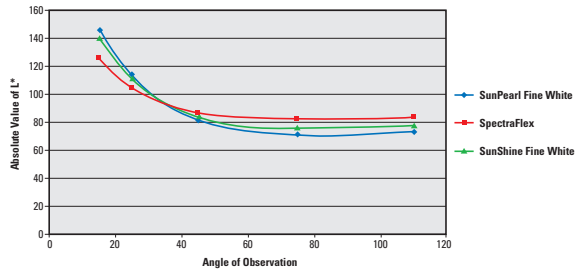
The efficacy of the alumina based SpectraFlex Focus pigments is further substantiated by the use of multi-angle spectroscopy. The diffused versus specular reflections of the SpectraFlex material is compared with the natural and synthetic mica based pearl pigments. The measurements are made on pressed powders as shown below in Figure 5. These pressed powders of SpectraFlex Focus pigments also exhibit a very clean, pure visual appearance that makes them especially attractive for many skincare applications.

# SunChemical

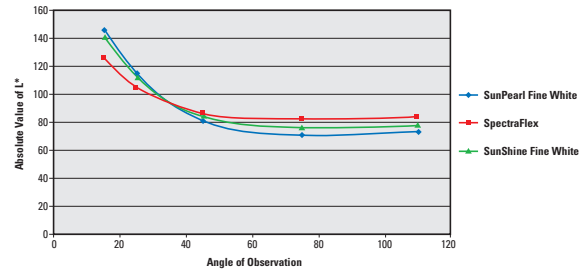
## Performance Pigments

The plots below show the superior light diffusing effect of the alumina based pigment when compared to the natural and synthetic mica based effect pigments. The multi-angle measurements under different illuminations all show the minimum flop of the SpectraFlex pigments.

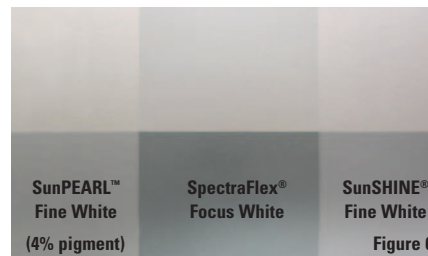
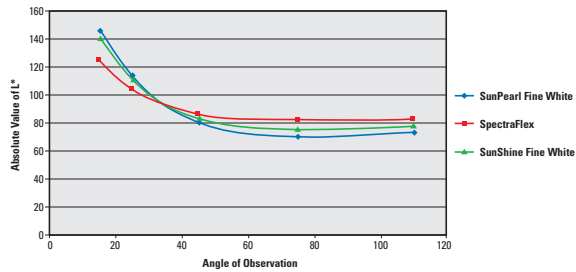
**CIE L\* - Luminosity - Light Source: Artificial Neon Light F11/10°**



**CIE L\* - Luminosity - Light Source: Day Light D65/10°**



**CIE L\* - Luminosity - Light Source: Interior Day Light A/10°**



This reduced flop compliments our previous claim of a higher light diffusion with these pigments. A higher diffusion with a lower spectral reflectivity makes these products unique as soft focus materials providing iridescent effects with maximum concealing ability of skin surface blemishes. These plots

authenticate the Spectraflex Focus pigments' ability to scatter more light than typical pearlescent pigments resulting in a uniform light distribution on the skin surface when used in skincare formulations designed for making skin surfaces free of blemishes and wrinkles.

and natural look in a formulation. They add cleanliness and translucency to the formulation as shown above in Figure 6.

SpectraFlex Focus pigments contain extremely low heavy metals based on state-of-the-art testing protocols using concentrated acid with total dissolution. Specific heavy metal contents are listed in the table to the left.

Heavy Metals	SpectraFlex Specifications
Mercury (Hg)	1 ppm
Arsenic (As)	1 ppm
Lead (Pb)	1 ppm
Cadmium (Cd)	1 ppm
Antimony (Sb)	1 ppm
Barium (Ba)	10 ppm
Copper (Cu)	10 ppm
Chromium (Cr)	10 ppm
Zinc (Zn)	10 ppm
Nickel (Ni)	10 ppm

These pigments also possess the ability to perform in any systems due to their translucent

### KEY ATTRIBUTES AND BENEFITS

- Fine and uniquely designed platelets of highly pure alumina coated with titanium dioxide
- Sophisticated combination of natural soft focus effect with a strong interference providing a low luster iridescence
- Enables formulators to create bi-functional make-up and skincare products combining concealing and skin tone enhancing effects, applicable to all cosmetic products
- Extremely low heavy metal content exceeding global regulatory requirements
- Highly translucent and clean skin tone effect
- Very smooth and soft textured powder proving a gentle feel to any formulation

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# SunChemical

## Performance Pigments



### **SUN CHEMICAL - GLOBAL SUCCESS IN A WORLD OF COLOR**

Sun Chemical Performance Pigments has been in the color business for over 100 years. Its leading edge technology is unsurpassed as it continues its commitment to solving the color issues of today and developing new solutions for the future. Headquartered in Cincinnati, OH, Sun Chemical Performance Pigments is a division of Sun Chemical Corporation.

With annual revenues of more than \$3 billion, Sun Chemical Corporation is the world's largest producer of printing inks and pigments. It also is a leading provider of materials and services to packaging, publication, coatings, plastics, cosmetics and other industrial markets. Sun Chemical has a worldwide network of more than 300 locations that provide customers local service with a global perspective.

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