MERCK

coating with our effect pigments

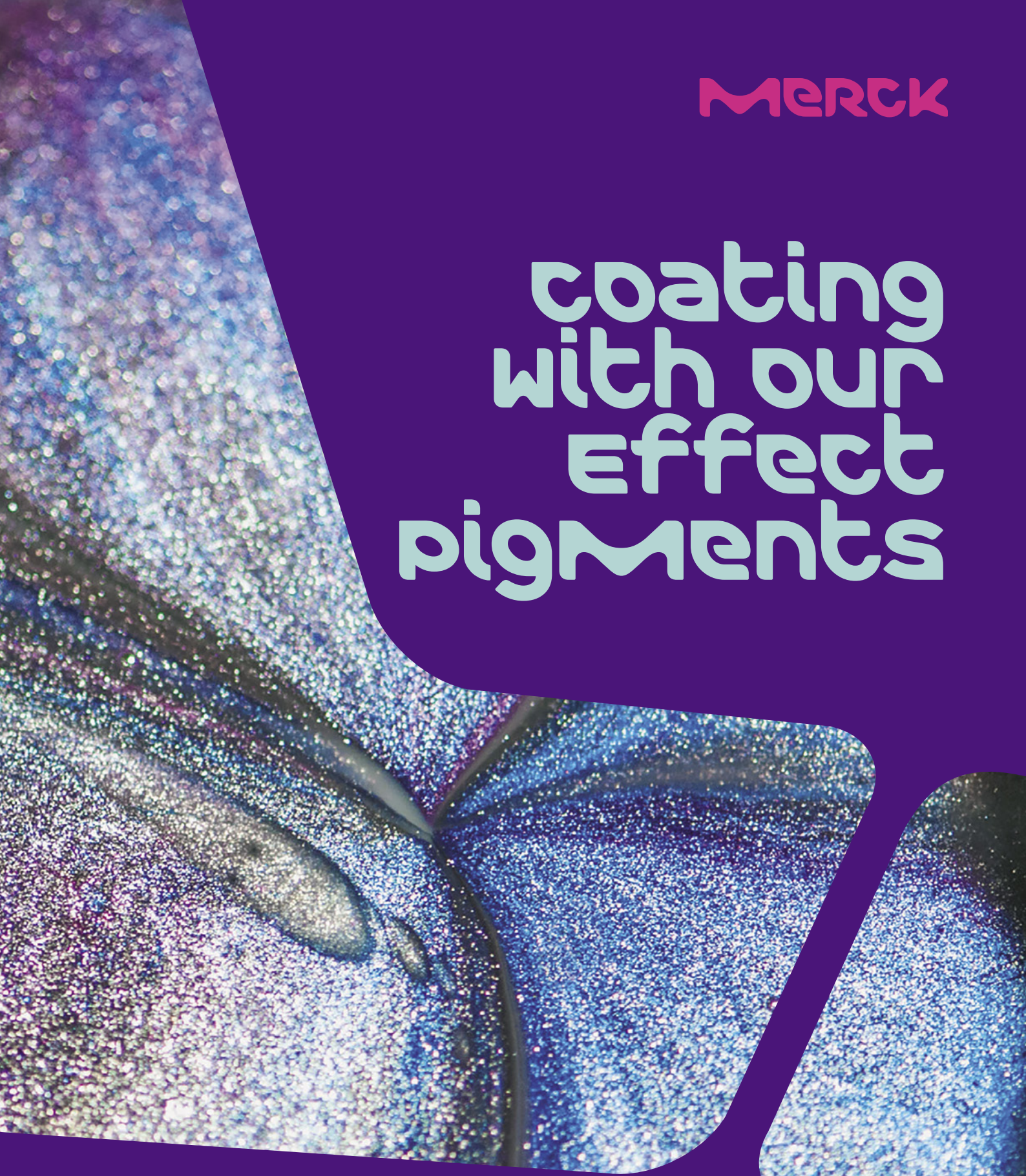


table of contents

appealing effect coatings

These days, we encounter varnishes and coatings everywhere, finding them above all in the automotive sector, in architecture, consumer electronics and in a multitude of consumer products. They protect surfaces and contribute significantly to appealing product design. Shapes, colors and effects attract us; they communicate, fascinate, motivate, and spark emotions.

Consumers frequently make their purchasing decisions based on first impressions. In addition to product quality and functionality, product design and surface refinement play an important role here. The product should match one's lifestyle and underscore their individuality.

Market demand is therefore increasingly directed toward effect coating formulations that enable a high-quality and customized product design and at the same time communicate functional product characteristics. With an effect pigment coating, products can be precisely positioned and thus stand out from the multitude of products on offer.

With their impressive glitter, luster, sparkle and dynamic color our effect pigments produce a visual improvement in all kinds of paints and coatings.

pigments with and without effects

Chromophoric absorption pigments
Generally speaking, pigments are colorants that are insoluble in an application medium. Absorption pigments (white, colored and black pigments) are chromophoric pigments. They produce true colors by absorbing a part of the light spectrum and reflecting the rest as color.

Eye-catching effect pigments
Effect pigments hold a special position among pigments. They are suitable for extraordinary color designs and special visual effects such as luster, sparkle or effect pigments that depend on the refractive index. The basis for these effects is the interplay between light and matter. The most important physical phenomena operating here are absorption, scattering, reflection and transmission. The impact of light rays on selected materials or combinations of materials produces not only colors but also attractive special effects.

Owing to their different modes of action, a distinction is made between metal effect pigments and pearl luster pigments.

Metal effect pigments commonly consist of thin, opaque metal platelets (aluminum, bronze or gold), which, like a mirror, reflect light in just one direction. Thus, both a solid, metal-like luster and a directed metallic reflection can be generated. The directed reflection is determined by particle size distribution and pigment morphology. The larger the pigment particles are, the more light is reflected from their surface.

Pearl luster pigments (see. fig. 1) can be of natural or synthetic origin. They enchant with gleaming, brilliant and iridescent color effects. They owe their characteristic pearlescence to the physical principle of multiple reflection of light on the transparent pigment platelets.

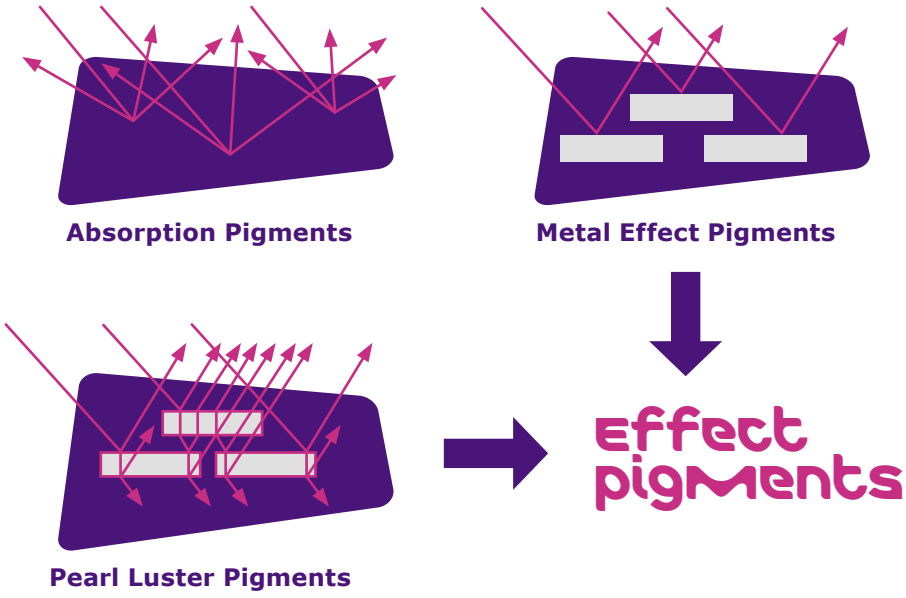


Figure 1

Classic pearl luster pigments

The substrate of classic pearl luster pigments consists of natural muscovite mica. This can be split into atomically flat platelets, which serve as a synthesis agent to produce thin layers. In the aqueous phase of the production process, metal oxides with a high refractive index – TiO_2 or hematite – are precipitated on the surface (see fig. 2). The resulting oxidic layer produces various transmission or interference colors, respectively. The interference color always corresponds to the complementary color of the respective transmission color. The colors are determined by the thickness of the oxide layer (see fig. 3). The difference in the refractive index between the pigment layers and the medium surrounding them is crucial for all interference effects, that is, the difference in color between the reflected light and the light that completely penetrates the pigment (see fig. 3). Another important property of classic pearl luster pigments is that the light rays of the transmission and of the reflection leave the pigment surface and the pigment's interior parallel to each other toward the viewer. The particle size distribution determines whether a silky shimmer or a brilliant sparkle is generated.

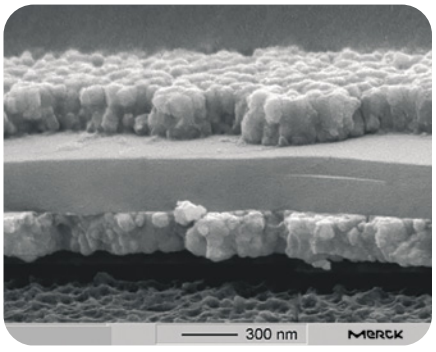
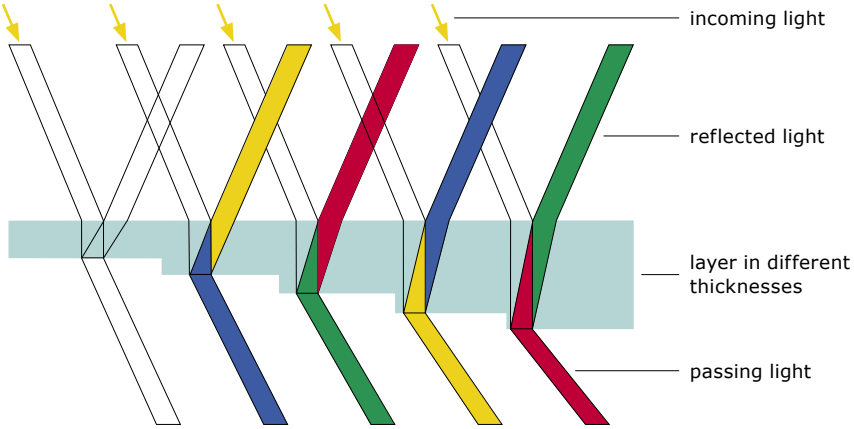


Figure 2: SEM cross-section of a typical mica TiO_2 pigment



Interferences

- overlay of different waves
- leads to a multitude of color impressions (additive)

Translation to pigments

- multiple reflections in thin layers
- color impression dependant on the thickness of layer (different refraction)

Figure 3

innovative effect pigments

In addition to natural mica as an effect pigment substrate, and thanks also to our own intensified research during the 1990s, we can offer synthetic substrates that enable innovative visual effects while retaining the advantages of mica-based pigments.

Synthetic substrates include silicon dioxide, aluminum dioxide, glass flakes and synthetic mica.

We have been producing these substrates ourselves for some time. The resulting control helps us to further optimize the pigment properties – for easy and safe processing and application.

In general, our effect pigments are based on the layer/substrate principle, in which the natural or synthetic substrate is coated with one or more metal oxide layers. (See fig. 4)

With our broad selection of color, sparkle, luster, glitter and shimmer effects, we offer coating manufacturers and designers an extensive design tool that visually enhances products.

Our product families Iriodin®, Xirallic®, Meoxal®, Miraval®, Colorstream®, Pyrisma® and Biflair® offer an extensive portfolio with products of the highest quality.

In addition, we have pigments with functional properties in our portfolio that have been developed for specific application areas.

Schematic composition

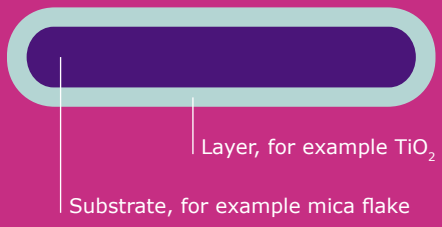


Figure 4

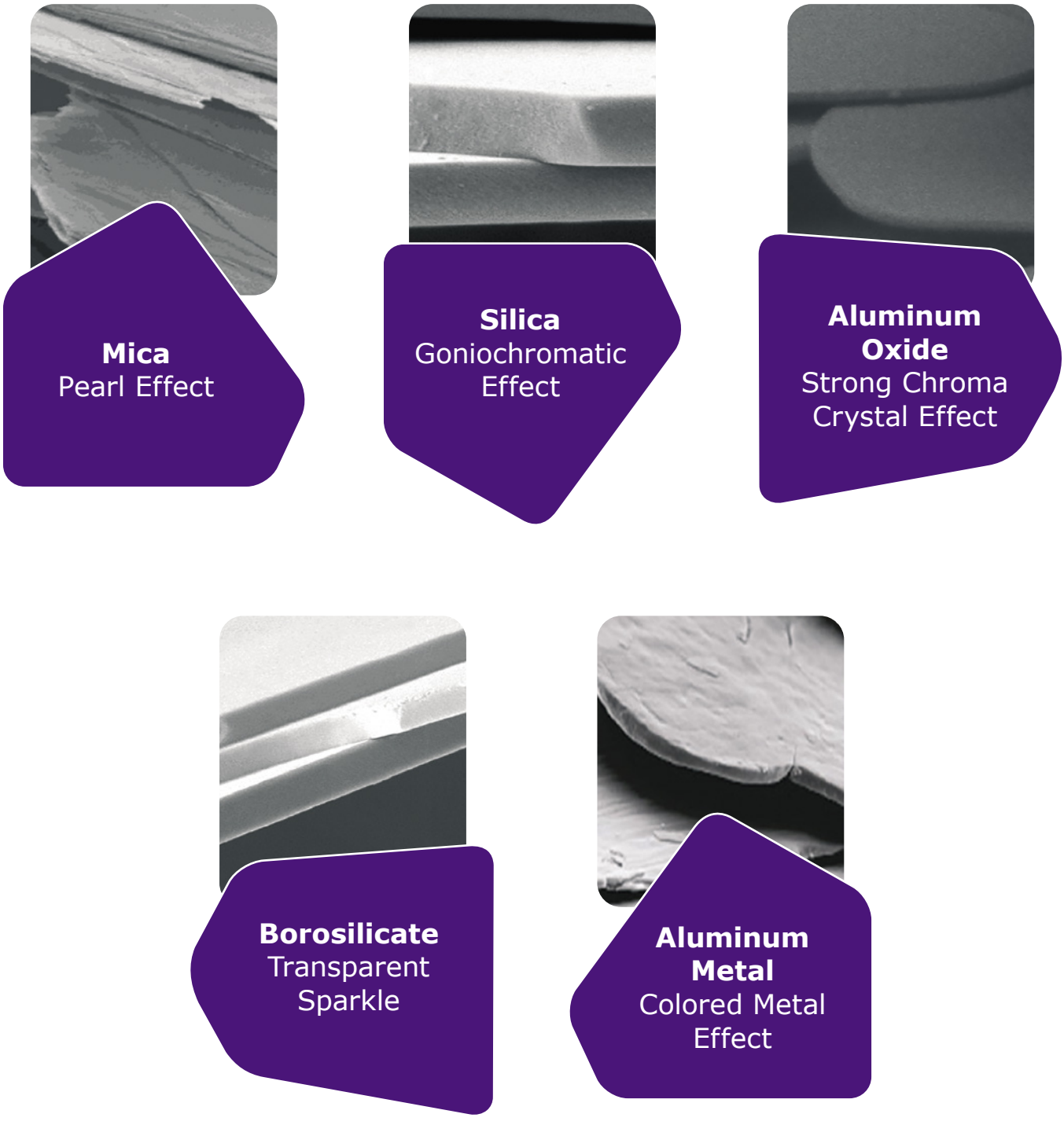


Figure 5: Scanning electron microsope (SEM) pictures of available pigment substrates

Xirallic® – high chroma crystal effect pigments

Characterized by their strong sparkle effects, Xirallic® products are optimized for brilliant coatings, especially automotive applications. Their powerful, extremely pure chroma and Living Sparkle® create a strong impression on every surface.

Xirallic® pigments are based on a synthetic aluminum oxide substrate. The Xirallic® technology is protected by various patents. The special luster effect is created from the absolutely smooth surfaces of the individual platelets which are manufactured in a special crystallization method with narrow particle size distribution. During the subsequent coating process, the aluminum oxide flake is coated with various metal oxides that have a high refractive index. This method produces both the extraordinary Living Sparkle® effect as well as the intensive and very pure interference colors. TiO_2 applied in different layer thicknesses is used to produce silver-white effect pigments as well as interference pigments of various colors. Coating with iron oxide permits colors from copper to red.

Due to small and narrow particle size distribution, Xirallic® is suitable for a variety of coating applications, for example automotive, plastic, industrial and powder coatings as well as for dispersion paints. Xirallic® can be easily combined with conventional color and effect pigments. The main application area is automotive coatings, where not only the crystal effect pigments' intensive color saturation and depth are particularly evident but also their universal technical applicability since they can rely on high quality and outstanding performance.

The highly reflective and chromatic pigments create elegant Living Sparkle® effects in all coating formulations.

Characteristics

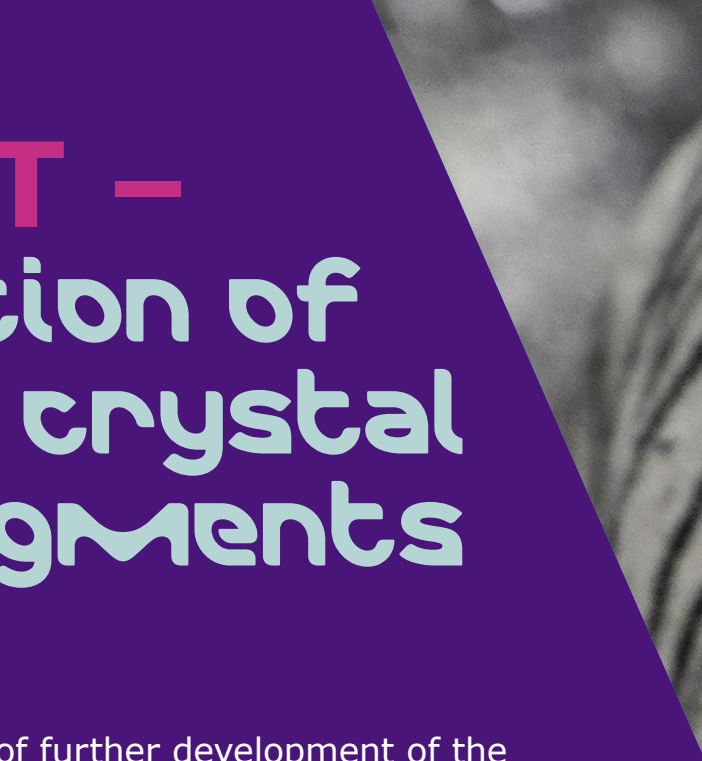
- Powerful Living Sparkle®
- Excellent color purity
- High-end performance
- Unique styling potential

Main application areas

- Automotive coatings
- Industrial coatings
- Powder coatings
- Plastic coatings

xirallic®

Xirallic® NXT – next generation of high chroma crystal effect pigments



Xirallic® NXT effect pigments are the result of further development of the fabulous Xirallic® product features with a close look at market needs. They combine powerful color, sparkling elegance and unmistakable purity. Our pigment designers have developed a masterpiece in brilliance and intensity. Specially developed for automotive coatings, Xirallic® NXT effect pigments provide exceptional sparkle and color travel as well as superior performance.

With Xirallic® NXT high chroma crystal effect pigments we have achieved the perfect symbiosis of visual fascination and reliable performance.

Xirallic® NXT Leonis Gold
This effect pigment is the first masstone gold pigment in the Xirallic® product family. Its dynamic Living Sparkle® is particularly striking in intensive, opaque color tones. It has an incomparable color saturation, clarity and depth that redefines styling possibilities.

Xirallic® NXT Tigris Blue
Its elegant, neutral blue offers an unrivaled range of variations, above all for black and blue stylings. The hue has an impressive clarity, depth and color intensity. Like all Xirallic® NXT effect pigments, Tigris Blue enchants with its unparalleled vibrant sparkle effect.

Xirallic® NXT Cougar Red
This effect pigment combines color-intensive, bluish red with magically Living Sparkle®.
The color spectrum of possibilities ranges from neutral red to bluish violet, and impresses with its exuberance. The pigment's luminosity makes colors glow. Red Living Sparkle®, with flashing points of light, adds incomparable magic to color stylings.

Xirallic® NXT Amur Black
Above all, Amur Black is characterized by depth and clarity, and conjures up a radiant shimmer on dark surfaces. The pigment opens up completely new styling possibilities, which are particularly effective when used in dark or gray stylings shades. The new Amur Black enables deep, color-intensive black stylings with stunning silver sparkle without obscuring the base tone with a grayish veil.

The main application area for Xirallic® NXT pigments is the automotive coatings industry. Xirallic® NXT combines extra-ordinary effects and interplays of color with outstanding technical applicability. The high-performance pigments are equally suitable for many other exterior and interior applications such as powder-, plastic- as well as wood and general industrial coatings.

Xirallic® NXT effect pigments combine powerful colors, sparkling elegance and unmistakable purity.

Characteristics

- Powerful Living Sparkle®
- High chroma
- Excellent color purity
- Innovative effects
- High-end performance

Main application areas

- Automotive coatings
- Industrial coatings
- Powder coatings
- Plastic coatings

Xirallic® NXT

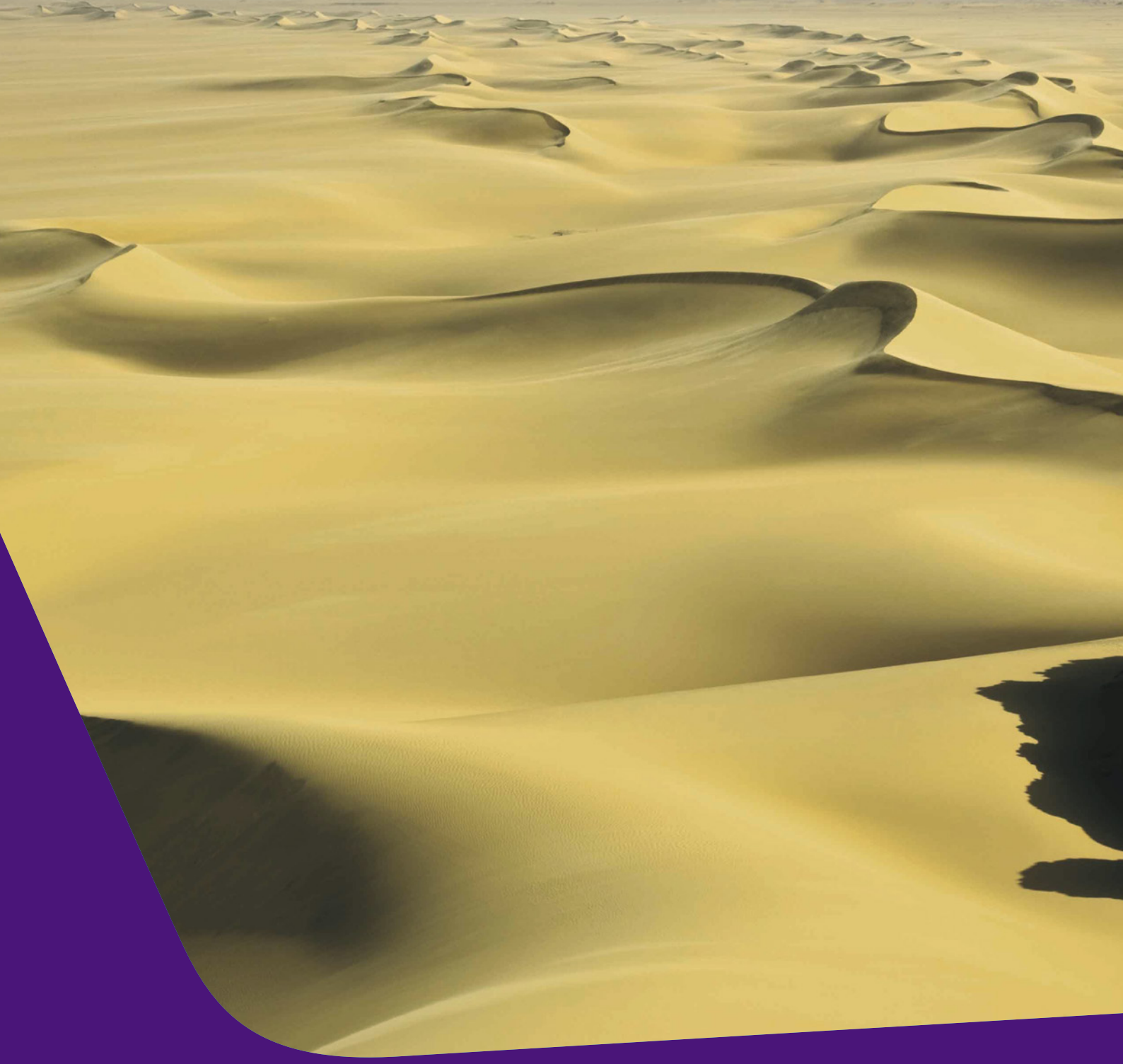
Meoxal® – luminous metal effect pigments

Under the theme “Desert Colors”, the Meoxal® pigment names aptly express the unmistakable product features of this color-intensive concept pigment series. The pigment names refer to the predominant colors of their respective deserts.

The sophisticated metal effect pigments of this product series are the result of continuous research and advanced production technologies. The combination of our patented platelet technology, a substrate coating with metal oxides, and an innovative interlayer expertise give Meoxal® its particularly intensive color brilliance and radiance. All pigments of this product series have a special weather treatment (CWT) which lends Meoxal® excellent weather and moisture resistance.

With its innovative layer structure and optimized particle size distribution, Meoxal® can be used in many types of coatings – even in water-based varnish systems. The special CWT surface treatment makes Meoxal® the first choice for high-performance applications, in particular for automotive and plastic coatings as well as coatings for high-quality exterior applications. All pigments of the Meoxal® series are supplied as paste based on carbitol, which enables safe handling of the pigment in regular production processes and storage. Meoxal® effect pigments can be combined with conventional absorption and effect pigments for fine color nuances. They are particularly suitable for stylings in warm colors such as red, brown or orange.

The striking, aluminum platelet-based innovative pigments unfold luminosity, depth and elegant texture in coating surfaces.



Characteristics

- High luminance
- Excellent color saturation
- High opacity
- Elegant texture
- Long-lasting weather and moisture resistance

Main application areas

- Automotive coatings
- Industrial coatings
- Plastic coatings

meoxal®

Colorstream® – unique silica effect pigments

The unique innovative production technology of Colorstream® is the platform to add surprising and breathtaking elements to your stylings.

On one hand outstanding high chromatic stylings can be realized with Colorstream® Lava Red, a pigment of dynamic color and harmony.

On the other hand the unique subtle to bold color travel of Colorstream® allows elegant to energetic styling effects.

Colorstream® effect pigments are based on the synthetic substrate silicon dioxide.

The combination of this unique substrate with coordinated layers of metal oxides produces effect pigments of astonishing iridescent interference colors.

TiO_2 containing Colorstream® effect pigments offer subtle to well balanced texture combined with inspiring angle-depending color travel, also called goniochromatic effect.

Colorstream® Lava Red with iron oxide layer surprises with intense chroma and very high opacity.

Colorstream pigments mix well with absorption- and effect pigments, like Xirallic®, Meoxal®, Pyrisma®, Iriodin® and aluminum pigments, opening a multitude of styling possibilities. Colorstream® is suitable for a wide range of coating applications such as automotive, architecture, consumer electronics, household, packaging and leather coatings.

Colorstream® effect pigments are also avaiable as weather-resistant surface treated version to ensure long-lasting performance in exterior application.

With their lively play of flowing color transitions, the attractive interference colors enchant even in subdued light.

Characteristics

Colorstream® Lava Red:

- High chroma red
- High opacity

TiO_2 containing Colorstream®:

- Color travel from bold to subtle
- Well balanced texture

Main application areas

- Automotive coatings
- Coil coatings
- Architectural coatings
- Consumer electronics
- Plastic coatings

colorstream®

Pyrisma® – high performance pearl effect pigments

Our Pyrisma® pigments are an innovative generation of pigments developed primarily for the needs of the coatings industry. We therefore call these high-performance interference pigments “Custom Pearl Pigments”, in which the particle size distribution, color, and application specific properties have been optimized at the same time.

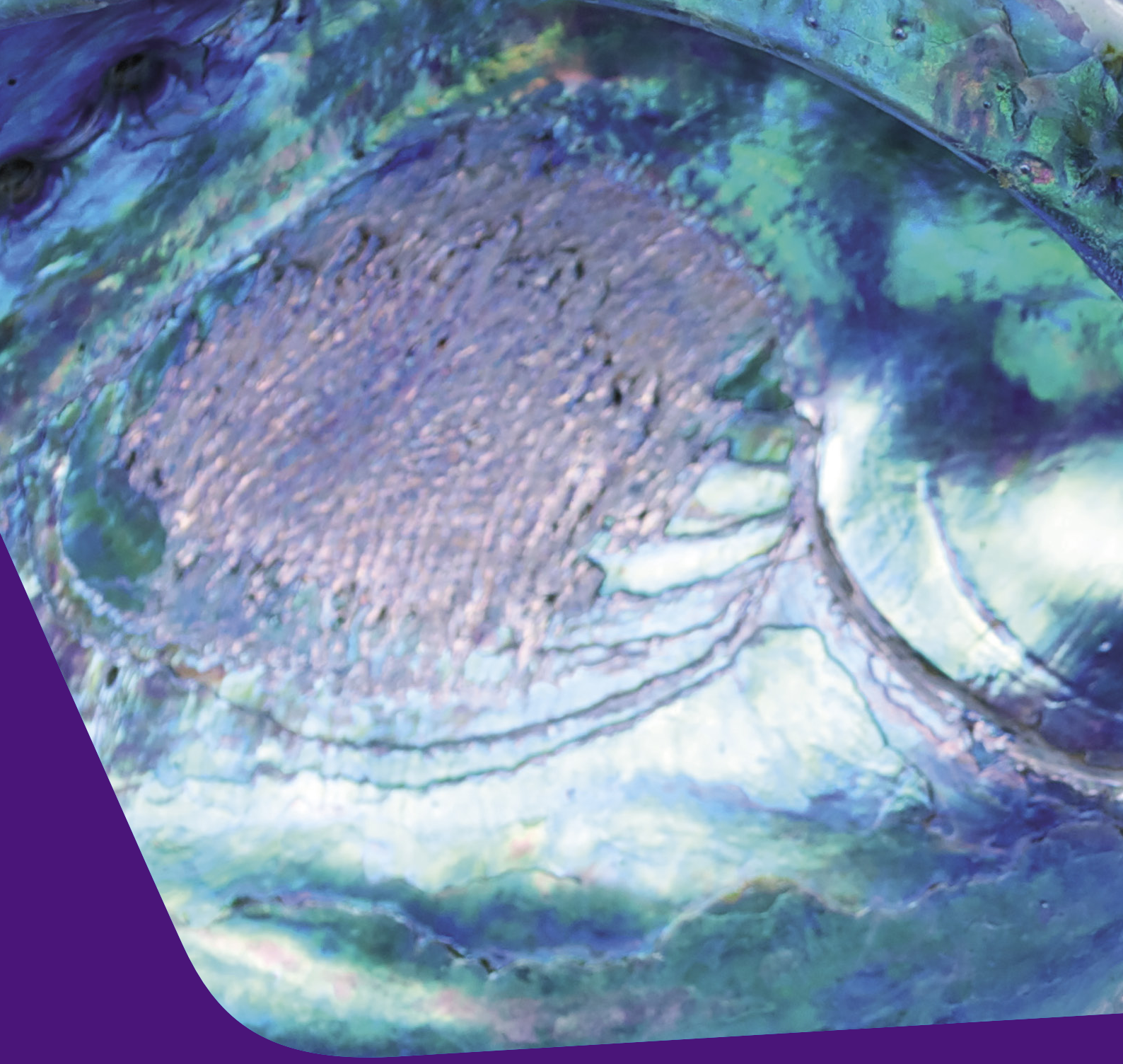
The exceptional color saturation and intensity of Pyrisma® pigments set new standards in the world of interference effects. An optimized technology is used to create attractive, highly chromatic and versatile colors such as blue or yellow. Even a special color point like indigo, which previously could only be achieved by mixing, now can be achieved as an extremely pure and chromatic interference color.

Pyrisma® pigments were created on the one hand to give designers new color and texture styling possibilities, and on the other hand to optimize the coating properties with regard to technical performance and surface quality. They are based on natural mica that is coated with TiO_2 interference layers. The prepared mica platelets have a particularly narrow and homogeneous particle size distribution.

A surface treatment gives the pigment particles their special moisture and weather resistance. In this way, Pyrisma® interference pigments demonstrate their abilities best in those application areas in which coatings are required to have long-lasting color stability, despite the most intense weather conditions: in vehicles and in architecture.

Variants without weather-resistant surface treatment are also available for interior applications, for example in industrial, dispersion, printing and artist paints, as well as for plastic coatings.

Fresh and intensive colors created with optimized mica technology for most intensive color intensity, saturation and performance.



Characteristics

- Strong color saturation
- Brilliant interference effects
- Highest humidity and weather resistance

Main application areas

- Automotive coatings
- Industrial coatings
- Powder coatings
- Plastic coatings

pyrisma®

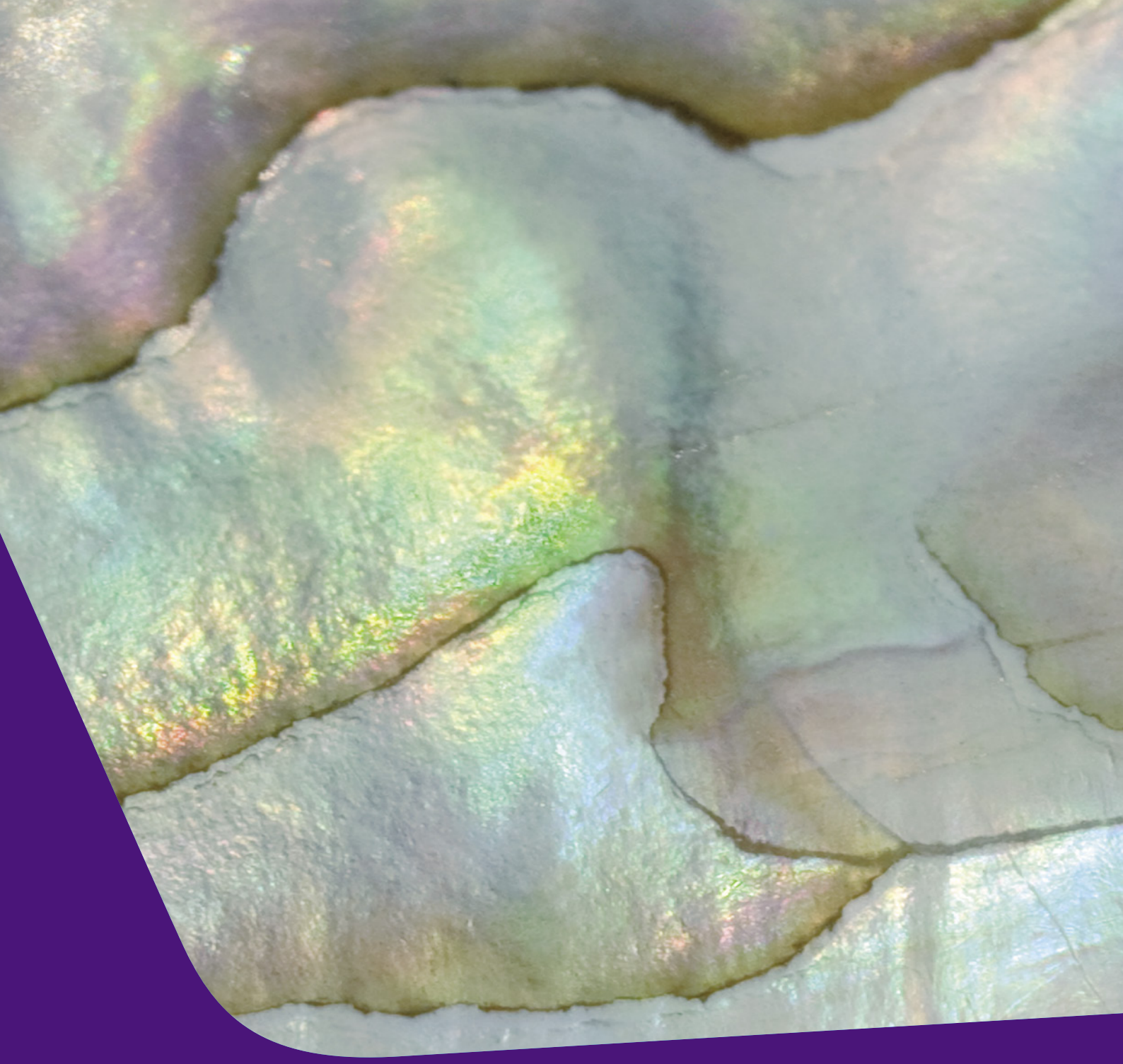
Iriodin® – pearl luster effect pigments

Iriodin® effect pigments are the classics that started it all. In the 1960s, our experts succeeded in producing market-ready pearl luster pigments. With this, we gave coating manufacturers a completely new design tool. When applied, the pigments create one-of-a-kind luster and color effects that we otherwise know only from nature – from pearls and mother-of-pearl.

Iriodin® pearl luster pigments consist of extremely fine platelets of the natural mineral mica, which are coated with a wafer-thin metal oxide layer. This produces semi-transparent pigments that give every application the characteristic luster that emerges from deep within. Depending on the pigments' particle size distribution, the effect varies from semi-gloss to highly glittering. The interplay between transparency, light refraction and multiple reflection is key to the enormous diversity of effects. Iriodin® pigments are also offered with an additional coating especially for outdoor applications. These weather-resistant pigments meet the highest requirements for reproducibility and long-lasting color consistency.

With their excellent visual and technical properties, pearl luster pigments enhance a wide variety of coating systems for interior and exterior applications. The pigments can be easily combined with other colorants. In addition to varnishes, Iriodin® also enhances plastics and printed products.

With their multifaceted color range, the pigments give coated surfaces a stylish aura and a lustrous finishing touch.



Characteristics

- Variety of bright silver-white and chromatic interference pearlescent effects from satin to sparkle
- One-of-a-kind color and luster effects
- Iridescent colors
- High effect variability from natural shimmer to sparkling glitter

Main application areas

- For a wide variety of coating applications
- Automotive coatings
- Industrial coatings
- Powder coatings
- Plastic coatings
- Printing

iriodin®

Miraval® – colorful glass effect pigments

Miraval® are glass effect pigments that combine luminous glitter with subtle rainbow effects. Crystal-clear colors benefit from fantastic reflective power. The pigment family gives coatings a special extravagance and value with their dazzling shine and exceptionally brilliant-colored sparkle.

The secret of Miraval® lies within. The pigments are made up of synthetically produced calcium-aluminum-borosilicate flakes that are coated with a silicon dioxide (SiO_2) protective layer and titanium dioxide (TiO_2) in rutile modification. The optically perfect surfaces of the transparent substrate maximize reflectivity, color and exceptional purity. The silicon dioxide protective layer increases the mechanical stability, optimizes the luster and rounds off the platelets' edges. The individual pigments have different thicknesses. This leads to various interference colors which, in addition to the main silver-white color, create a distinct rainbow effect.

Miraval® effect pigments turn every coating into something very special. They are suitable for powder coatings, industrial coatings and dispersion paints, and refine fashionable leather accessories as well as household appliances, wood surfaces, plastics and printed materials. Thanks to their post coating, Miraval® product lines created especially for outdoor use demonstrate excellent weather resistance, and allow the pigments to be used, for example, in facade coatings.

The various-colored pigments from the Miraval® family can be combined with each other as desired, and thus offer particularly versatile styling potential. A modification in the pigment concentration creates changing effects – from individual points of reflection to a metallic character. In order to give a formulation a very subtle sheen or shine, pigment concentrations of less than one percent can be added without sacrificing color intensity.

The pigments' high transparency creates a spectacular firework of colors on product surfaces.

Characteristics

- Enormous color purity
- Brilliant glitter
- Colored sparkle
- High transparency
- Radiant luster

Main application areas

- Industrial coatings
- Powder coatings
- Plastic coatings

miraval®

Biflair® – silky silver luster effect pigments

With their uniquely intense silky luster, the brilliant Biflair® silver luster effect pigments create the impression of liquid metal in coatings. Owing to their square or octagonal shape, the semi-transparent crystals develop an even, fine appearance with a subtle, satiny sheen. The combination with classic Iriodin® pearl luster pigments, for example, offers an almost infinite range of effect variations.

Biflair® products are pastes with effect pigments based on bismuth oxychloride (BiOCl), which is produced in a special crystallization process. The Biflair® bismuth oxychloride platelets are characterized by a silky metallic luster, high whiteness, excellent hiding power and a narrow particle size distribution.

With their three-dimensional appearance and subtle, silky gloss, Biflair® effect pigments enhance plastic, leather, wood and industrial coatings as well as artist and dispersion paints. They give plastics and printed materials an incomparably refined silvery luster. In coatings, they lend cell phones and consumer electronics products as well as sports and high-tech equipment a high-class or even futuristic look.

For a broad color spectrum, the versatile Biflair® silver luster effect pigments can be mixed with various organic and inorganic color pigments. Biflair® pigment pastes are available in various dispersions for a wide range of binder systems.

The satiny, refined silky luster gives coating stylings a subtle, delicate touch of sublime nobility.

Characteristics

- Silky silver luster
- Refined appearance
- Comprehensive combinability

Main application areas

- Industrial coatings
- Plastic coatings
- Dispersion paints

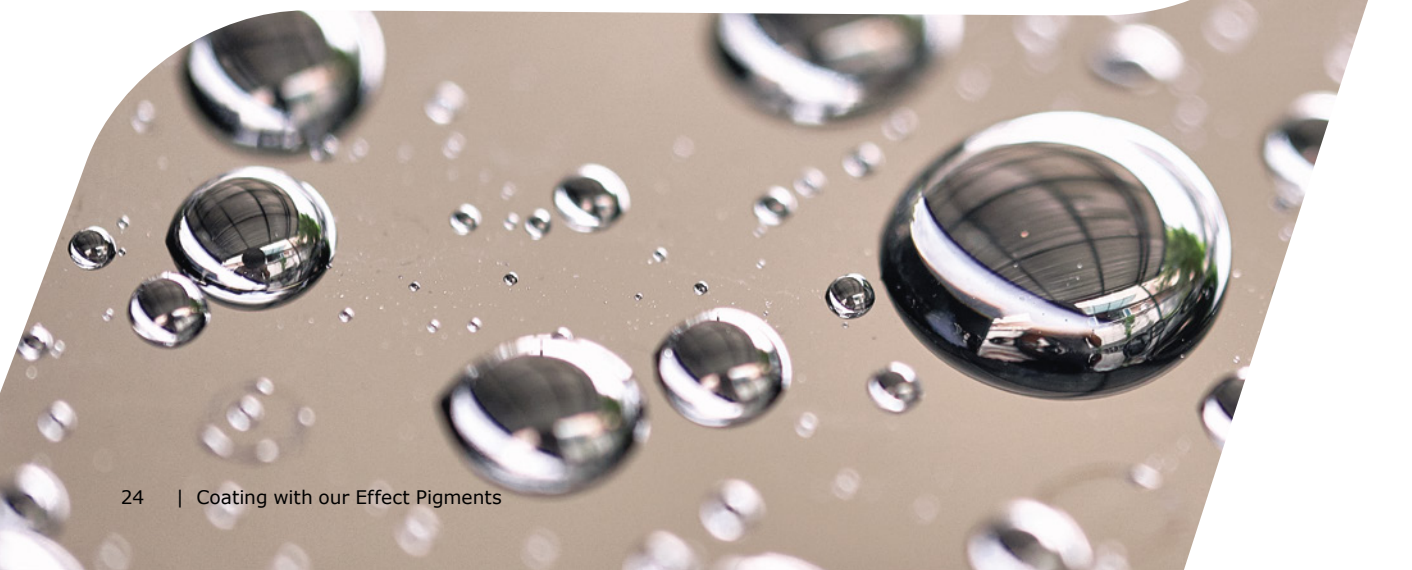
biflair®

weather-resistant effect pigments for lasting colors and brilliance

Besides rain, snow and hail, varnishes and coatings for outdoor applications also have to withstand sunlight, heat and frost over a long time and under constant change. In order to meet these extremely high requirements, we have developed a special range of weather-resistant effect pigments – for lasting brilliance, color and enjoyment in coatings, for example on building facades or vehicles.

Resistant through surface treatment

The quality of weather-resistant pigment variants that have proven themselves over decades in our Xirallic®, Xirallic® NXT, Colorstream®, Pyrisma®, Iriodin® and Miraval® product families are designed to meet even the high expectations of the coatings industry. An additional surface treatment makes the pigment particles resistant and ideal for use in demanding outdoor applications. In modern high-rise buildings, the effect pigments give facades that certain something or accentuate individual elements. For thin-film applications, for example in the automotive industry, a surface treated pigment variants provide two essential qualitative features: they have a narrower particle size distribution with a simultaneously reduced number of coarser particles, and they have a lower coloristic tolerance.



Also recommended for sanitary areas

Our specialists also recommend weather-resistant effect pigment variants for indoor use when surfaces are exposed to special environmental influences such as moisture or UV radiation. They are especially suitable for refining varnishes for furniture or electrical appliances as well as for sanitary areas.

application segments for effect pigments

Automotive OEM coatings

Regardless of the base color of their new car, approximately 70 percent of all car buyers opt for an effect coating. A top-quality, high-effect color palette enables automakers' vehicles to stand out in this highly competitive market. Our effect pigments offer an almost unlimited number of innovative effects. They fulfill the highest technical requirements and permanently withstand the impacts of weather.

Automotive refinish coatings

High-quality automotive refinish coatings are distinguished by consistent colors and quality that remains the same year after year. Even slight deviations in the coloristic can lead to unsatisfactory repair results. Our weather-resistant effect pigments guarantee a reliably high level of color consistency and maximum reproducibility.

Powder coatings

Our effect pigments offer outstanding styling potential in powder coating formulations. These high-quality coatings are used, for example, in architecture, industrial products, furniture and bicycles. For outdoor applications, we recommend our pigment lines with weather-resistant surface treatment. The simple and safe processing of the effect pigments offers coating manufacturers and coaters a whole array of technical and economic advantages.

Plastic coatings

Elegant, attractive design often makes the difference when competing for customers. This also applies to consumer electronics and in the automotive and aerospace sectors, among others. With our Xirallic®, Meoxal®, Pyrisma®, Colorstream®, Iriodin® and Miraval® brand effect pigments, plastic coating manufacturers can impressively meet the market's demand for individualized and futuristic coating stylings. From soft shimmer to striking sparkle – our effect pigments combine high performance and quality with long-lasting color stability.

Leather coatings

Our effect pigments provide products from the leather industry a high-quality and first-class appearance. In leather coatings, they unfold an almost limitless variety of extraordinary and fashionable effects that upgrade leather products in a unique and contemporary way. Pigments from our Pyrisma®, Colorstream®, Iriodin® and Miraval® product families are particularly popular for refining shoes, handbags, belts, wallets and many other leather accessories.

Wood varnishes

Certain effect pigment types accentuate the characteristics of wood surfaces – regardless of whether they are added to opaque or transparent coatings. In particular, the silver and gold effect pigments of the Iriodin®, Colorstream®, Pyrisma® and Miraval® product families lend an elegant appearance to wood flooring, furniture and wood construction elements. In transparent coatings, effect pigments underscore the special grain of various wood types.

Industrial coatings

Our innovative effect pigments significantly enhance the perceived value of industrially coated products from the most varied categories. Effect pigments offer designers a multitude of possibilities for specifically positioning products on the market through individualized design. The two-wheeler industry relies on pigments such as Xirallic®, Pyrisma®, Colorstream® and Iriodin® for brilliant high-tech colors, thus emphasizing the top quality of bicycles, motorcycles and scooters. The mechanical engineering industry is increasingly adopting the refined look of effect coatings, and innovative effect colors also have found their way into the market for can coatings, thereby expanding suppliers' color palettes.

Artist paints

The radiance of our effect pigments lends artist paints a special aesthetic appeal. Whether oil, acrylic or water-based paints, artists have appreciated the richness of Iriodin® pigments' effects for many years, and are increasingly discovering the new possibilities opened up by the Pyrisma®, Colorstream® and Miraval® product families. With their fascinating glitter, luster, and color effects, the pigments open up completely new forms of artistic expression. Hobby and home improvement markets also profit from our innovative strength, and offer their customers product ideas loaded with effects.

Dispersion paints

Discerning and appealing design creates joy and added value. This also applies to the design of interiors and house facades. Dispersion paints with effect pigments are used for decorative wall design, among other applications. They thus support the trend towards individually designed living and working spaces.

Aircraft paints

Coating manufacturers in the aviation sector employ our effect pigments to expand their styling options – from classic, to modern, to surprising, to customized. Our pigment families combine exceptional effects with impressive weather stability. Upmarket color and effect stylings communicate the aircraft's cutting-edge technology and its associated safety.

Coil coating

Our large selection of effect pigments also opens up completely new dimensions for surface refinement in coil coating processes. The pigment families enable individualized and innovative stylings of coil-coated sheet metal for architecture and other applications. The product enhancement achieved by the effect coating sets new aesthetic standards.

Formulating with effect pigments

Our effect pigments are appropriate for all conventional varnish and paint systems. Right from the development stage, our experts make sure that the pigments can be processed easily and safely. For optimal effect and color development, a few basic aspects must be observed during formulation, production, application and testing.

Powder coatings

Pearl luster pigments are platelet-shaped pigments. When adding them to varnishes and paints, they cannot, as is usual with conventional color pigments, be incorporated via extruder with subsequent grinding. The shear forces and mechanical loads that occur would break the pigment platelets, resulting in a considerable loss of luster and effect in the coating.

To prevent platelet damage, effect pigments may only be added to the powder coating at the end of the manufacturing process. For this, two established processes may be used: the dry blend process and the bonding process. In the simpler and more cost-effective dry blend process, effect pigments are mixed as gently as possible with the base powder coating. In the bonding process, effect pigments are thermally bonded to the powder coating. The resulting stronger bond between effect pigment and powder coating results in better powder properties, and additionally opens up new styling options. The disadvantage of the bonding process is its higher cost.

The use of our weather-resistant pigments makes a second coat of paint to protect the pigments from the weather influences unnecessary.

Dispersion paints

Dispersion paints that contain aqueous plastic dispersions as a filming agent primarily use vinyl acetate copolymers, depending on the property profile required. Because dispersion paints are loaded with fillers, effect and color pigments, they exhibit high pigment volume concentration (PVC) values. Critical for a good formulation with platelet effect pigments are the aspects of pigment orientation and transparency.

The effect comes out best when not obscured by opaque elements in the formulation. Since there is also the need for hiding power, a good balance it the ciritical point in formulation work.

Pigment orientation shows up with brush strokes and needs to be taken into consideration. It can be used to create deliberate patterns and effects.

Liquid coatings

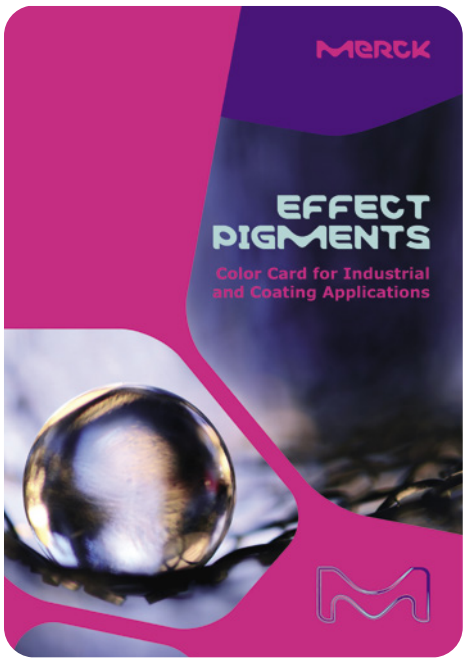
The pigments' platelet shape and layer structure required for the interference effect are highly susceptible to breakage. Therefore, only relatively low shear forces should be applied during dispersion. Dispersing devices such as roller mills, ball mills or bead mills normally used for incorporating conventional pigments should not be employed; they could destroy the platelet-shaped pigments, which would lead to a loss of luster and effect.

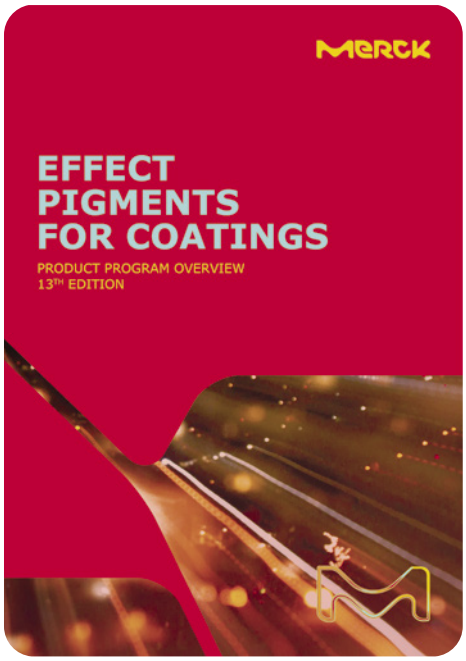
If dissolvers are used, the mixing time should be as short as possible and the stirring speed should be maintained as low as possible. We recommend prewetting the pearl luster

pigments with a compatible solvent or binding agent in order to simplify and accelerate incorporation.

If pearl luster pigments and inorganic or organic absorption pigments are used at the same time, the latter should be predispersed in the usual manner. To complete the varnish formulation, the pearl luster pigments are added as a powder or paste only at the end of the manufacturing process and carefully mixed in.

General color card & Digital color card





partnership-based cooperation

The possibilities of color and effect design have multiplied in all application areas over the past years. In our close, trusting cooperation with trend scouts, designers and customers from the coatings industry, our research focus is not only on the development of innovative product classes but also on the advancement of existing effect pigment technologies. For example, we have developed substrate materials with defined geometric properties with the aim of creating improved or completely new color effects. More recent developments have led to extremely attractive results: the Colorstream® Lava Red multicolor effect pigments and the color-intensive crystal effect pigments of the Xirallic® NXT series.

We offer our customers the opportunity to develop innovative products and intelligent solutions together with us. Please contact us!

comprehensive service

For our customers in the coatings industry, we provide various services and documentation for pigments specially tailored to coating applications. We also offer application technology support and a presence in the world's core markets. With more than 60 years of experience, we are constantly developing new generations of effect pigments that help shape the demand for a contemporary and high-quality appearance of a wide range of product groups.

W.58917.0 8/2021

Merck KGaA
Surface Solutions
Frankfurter Str. 250
64293 Darmstadt, Germany
effects-for-coatings.com

EMD Performance Materials Corp.
Surface Solutions
1200 Intrepid Avenue, Suite 300
Philadelphia, PA 19112, USA
emdpigments.com
An affiliate of Merck KGaA, Darmstadt, Germany

Merck Performance Materials G.K.
Surface Solutions
ARCO Tower, 11F
1-8-1, Shimomeguro
Meguro-ku
Tokyo 153-8605, Japan
merck-performance-materials.jp
An affiliate of Merck KGaA, Darmstadt, Germany