

Harnessing the Brilliance of Daylight Fluorescent Pigments

Sustainability, Performance and Application Growth



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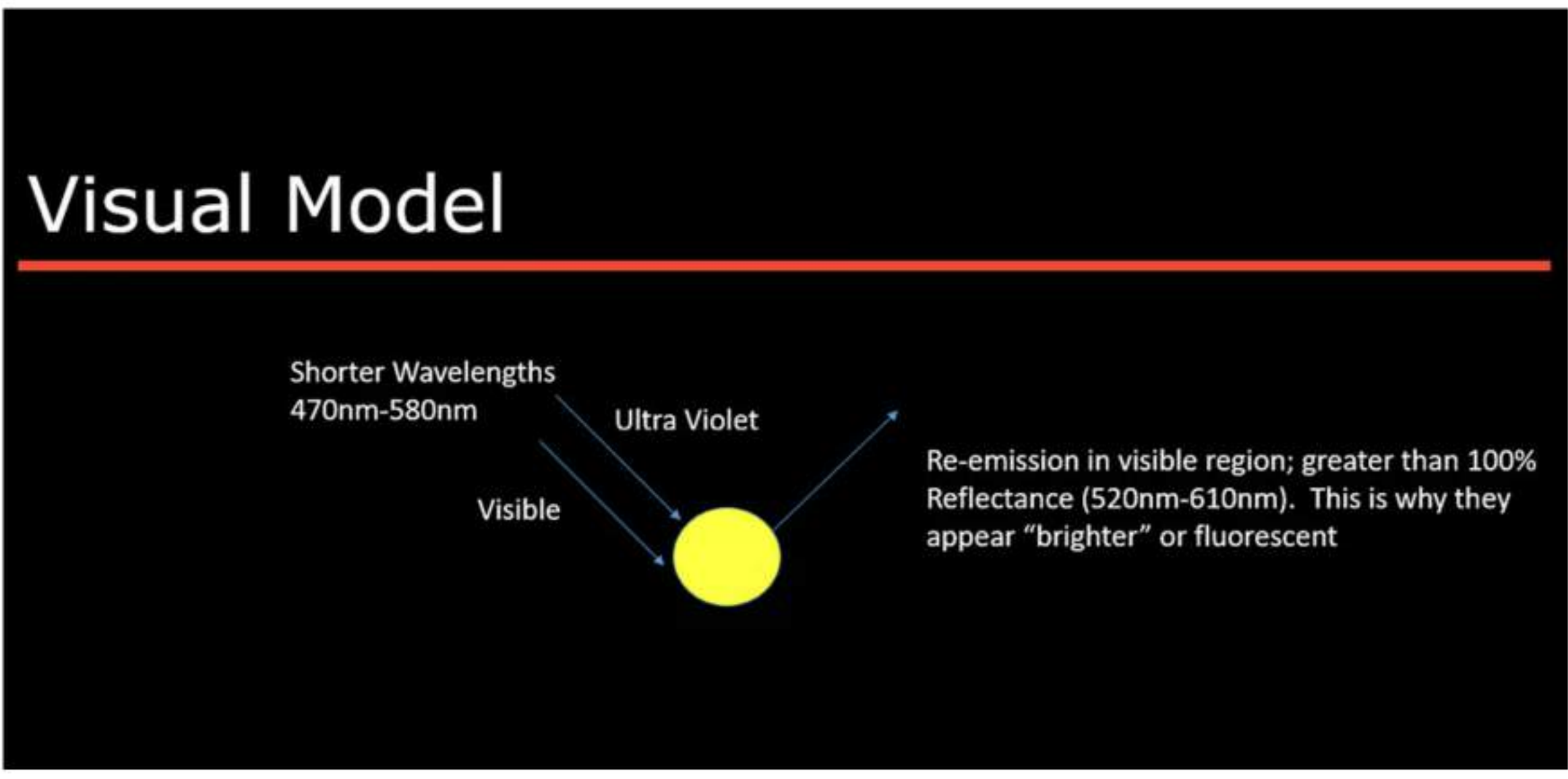
Fluorescent pigments have made a significant impact in the coatings and inks industries by providing not only aesthetic appeal but also functional advantages such as enhanced visibility. Daylight fluorescent pigments, in particular, offer unique visual effects by re-emitting light at longer wavelengths, creating their characteristic vibrant appearance. This article delves into the technology behind these pigments, their manufacturing processes and how they are tailored to meet the demands of coating and ink applications.

What are Daylight Fluorescent Pigments?

Fluorescent pigments are not “pigments” in the classical sense, but rather they are fluorescent dyes solubilized in a given polymer matrix. This dyed polymer fluorescent pigment is then provided in a format, such as dry powder, suitable for a given end application.

Daylight fluorescent pigments are engineered to absorb shorter wavelengths of light, typically in the ultraviolet (UV) or visible spectrum and re-emit that energy at longer wavelengths in the visible range. This process results in intense, eye-catching colors, often with reflectance values exceeding 100%, making them highly effective for high-visibility and decorative applications in coatings and inks.

FIGURE 1 | Visual model.



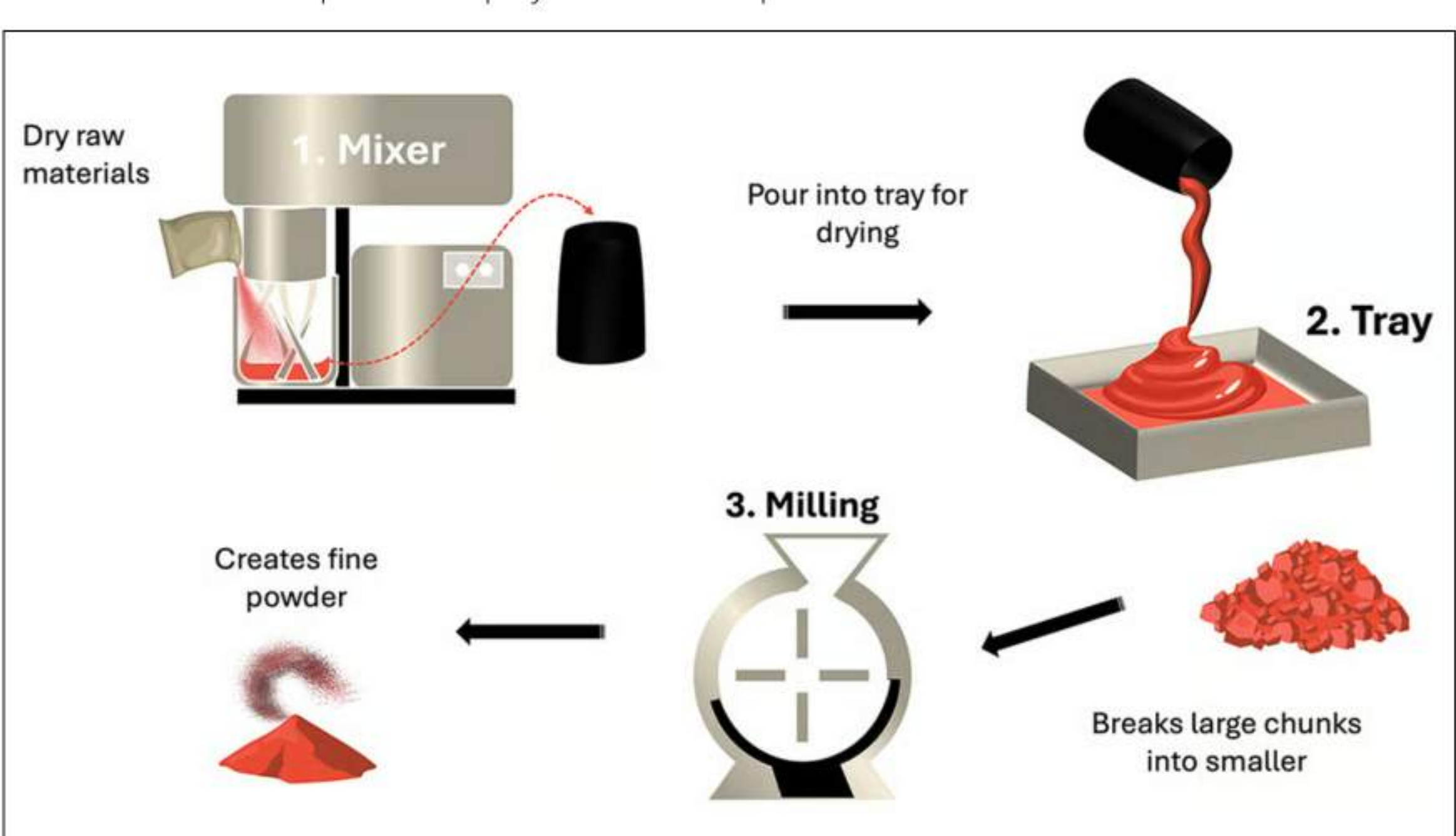
Unlike conventional pigments, daylight fluorescent pigments are typically “stir-in” products, requiring only low-shear mixing to incorporate them into formulations, simplifying the production process. This also makes them easy to use in various coating systems.

Manufacturing Techniques for Daylight Fluorescent Pigments

The production of daylight fluorescent pigments involves various polymerization techniques that ensure the pigments meet the performance requirements of coatings and inks, including color vibrancy and stability.

1. *Bulk polycondensation*: This process involves adding raw materials to a vessel, heating them and building molecular weight and viscosity. The resulting melt product is cooled so the final solid can be milled into smaller particles.
2. *Suspension polymerization*: Suspension polymerization results in spherical particles that are chemically stable and cross-linked, making them well-suited for solvent-based inks and coatings where resistance to chemical attack is critical. The spherical particles can be separated and provided in powder form, or they can remain in a carrier vehicle for paste applications.
3. *Emulsion polymerization*: This method creates submicron-sized particles suspended in water at a very low viscosity. These products are ideal for water-based printing inks and textile applications that demand fine dispersion and uniform color distribution.

FIGURE 2 | An example of bulk polycondensation process.



Applications in Coatings and Inks

Daylight fluorescent pigments are widely used in the coatings and inks industries due to their ability to deliver superior brightness and visibility and aid in product differentiation. These pigments find applications in everything from decorative finishes to functional uses such as safety markings.

Coatings

In coatings, daylight fluorescent pigments are used to create vibrant, high-visibility finishes. These pigments are ideal for aerosol paints, craft paints and specialty coatings such as theatrical paints and seed coatings. They are also commonly employed in industrial applications where enhanced visibility is crucial, such as road markings and safety signage. The key benefit of using fluorescent pigments in coatings is their ability to maintain brightness under diverse lighting conditions.

Inks

For inks, daylight fluorescent pigments offer excellent brightness and color intensity, especially in applications where high impact is essential. These pigments are used in lithographic, flexographic and screen-printing inks for posters, packaging and textiles.

Water-based and UV-cured inks benefit from the fine particle size of fluorescent pigments, which ensures uniform dispersion and color vibrancy across printed surfaces. The pigments’ ability to emit more light than they absorb provides unparalleled brightness, particularly valuable in branding and advertising applications.



Technical Considerations

When incorporating daylight fluorescent pigments into coatings and inks, several formulation factors must be considered. These pigments are particularly sensitive to environmental conditions, such as UV exposure and heat, which can cause them to fade over time. To combat this, formulators often add UV stabilizers and other protective agents to extend the longevity of the pigments’ vividness.

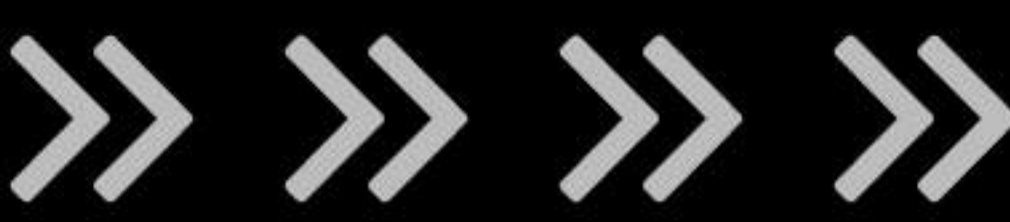
The fluorescent pigment chemistry in coating or ink applications must also be carefully selected to ensure suitability for the intended use. For example, solvent-based systems require pigments with high chemical resistance, while water-based systems benefit from pigments with excellent dispersion stability.

Conclusion

Daylight fluorescent pigments provide unparalleled brightness and visibility, making them essential for high visual impact coatings and inks. Their versatility and wide range of applications — from decorative finishes to functional safety markings — make them a valuable tool for formulators. By understanding the manufacturing processes and technical considerations, manufacturers can leverage these pigments to create vibrant and eye-catching products that stand out in the marketplace.

For more information, [click here](#).

Feature images courtesy of The Brilliant Group, Inc.



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