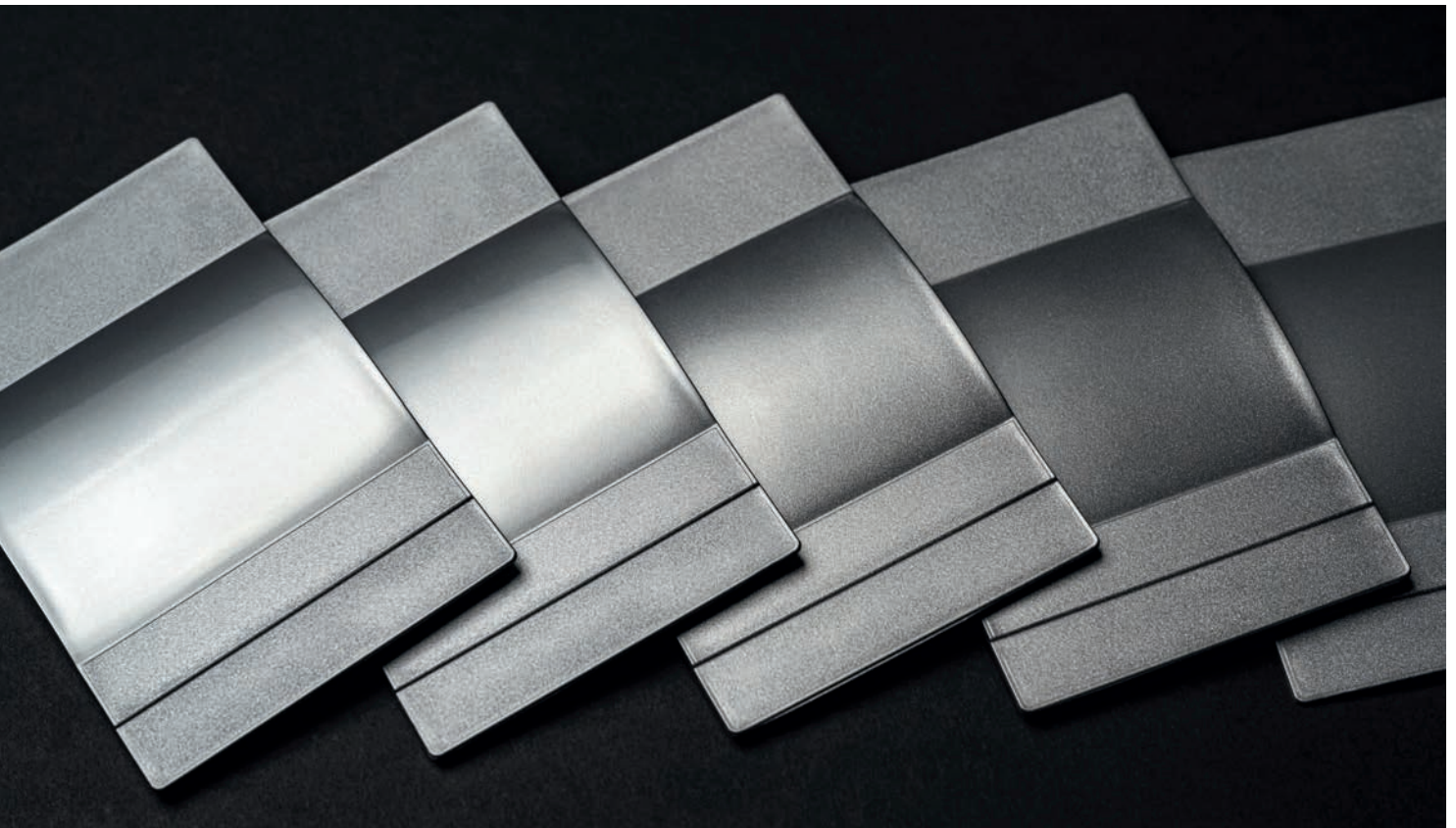


Pigment Combination Makes NIR Sorting Easier

A Silver Lining for Recycling

Metal-effect pigments make for attractive designs, but they might influence detection when it comes to recycling. NIR sensors are unable to reliably sort plastics containing them. Eckart has now made sorting easier by developing a special silver pigment based on a combination of two conventional pigment technologies.



Plastic products with a metal-effect finish are attractive. However, the effect pigments make recycling difficult. © Eckart

Near-infrared spectroscopy (NIR) is extensively used in recycling plants to uniquely identify polymers (Fig. 1). Among its many advantages are remote high-speed measurement, deep penetration of the NIR radiation and high sensitivity. With NIR spectroscopy, recycling plants are able to identify and automatically sort different polymers, so that they can be separated by resin type.

Success in the sorting of plastics waste is determined by the color, surface composition and shape of the plastics. These can influence the intensity of the measured spectra. Optical NIR

sorters, for instance, have been unable to reliably sort black plastics. The reason is that the oft-used carbon black pigments absorb a large portion of the light, thereby rendering identification impossible. Solutions for black-pigmented plastics have since become available on the market.

Optical NIR sorters are also fairly unreliable when it comes to sorting plastics containing metal-effect pigments. These pigments act as microscopic mirrors and scattering centers for the NIR radiation, and that may lead to attenuation of the reflected NIR signal.

In the case of conventional metal-effect pigments, that signal may experience interference. As a result, the polymer may not be correctly recognized and thus uniquely identified.

Metallic Effect Bestows an Aura of Exclusivity

Metallic effects, however, play a major role in the finishing of products, especially packaging. Surfaces with a metallic appearance convey the impression of high value and exclusivity. Golden and silver elements expand the

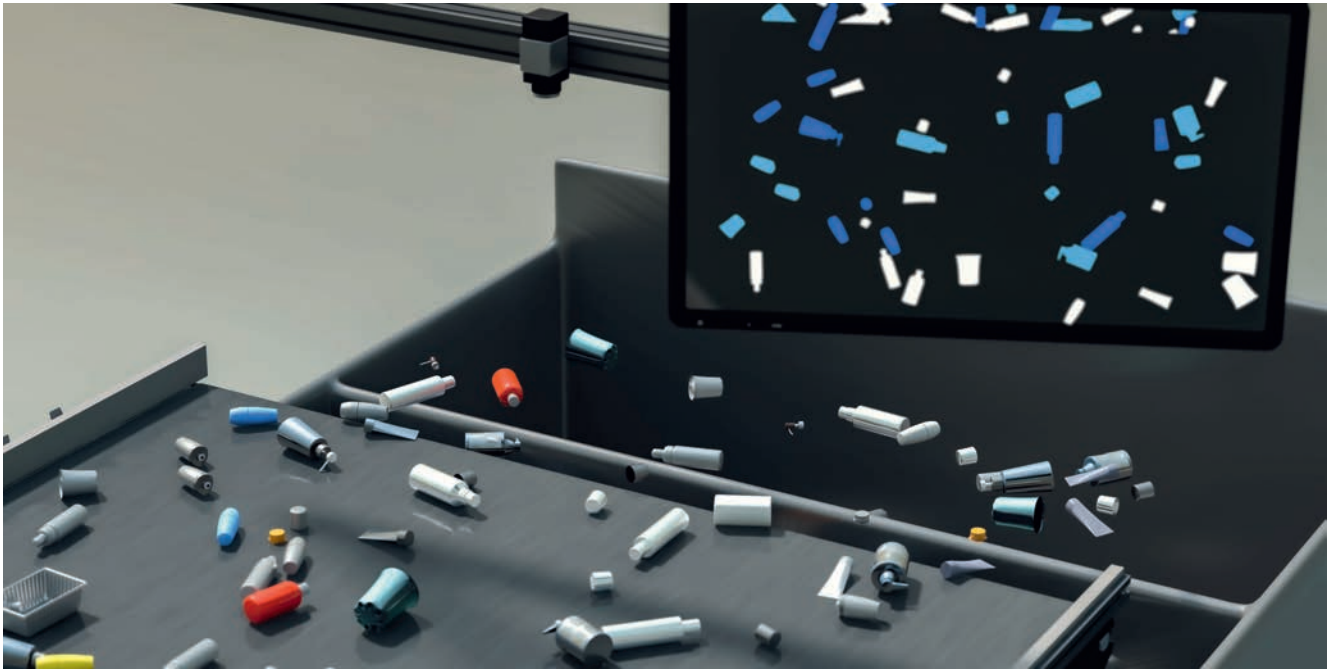


Fig. 1. NIR spectroscopy is widely used in recycling plants to sort plastics waste. © Eckart

respective color space considerably; they can accentuate and unlock interesting new design options for packaging that appeals to the consumers' senses and entices them to buy. In the plastics sector, packaging is therefore tinted with metal-effect pigments that generate a silver or golden shimmer

along with mirror-like and chrome effects, and create intense light-dark transitions. Combinations of metallic pigments with transparent, colored pigments and dyes offer a vast range of design possibilities.

To ensure that the desired metallic brilliance gets past the point of sale and also that the metallic-colored packaging can be recycled at the end of its life, Eckart has devised an alternative to the commercial metal-effect pigments usually employed for plastics.

A Pigment Development Brings NIR Detectability

By combining selected metallic pigments with the recently developed Symic604 series of pigments, the manufacturer has succeeded in producing very attractive silver shades for plastics that offer high levels of NIR detectability. Called NIR Silver, this new product range has been designed to meet the detectability and automated-sorting requirements of recycling plants (**Fig. 2**). The pigments reflect the specific wavelengths in the fingerprint range that are needed for correct polymer identification. This is often not possible with conventional silver pigments (**Fig. 3**). NIR Silver does not give rise to any signal interference. The characteristic reflection curve of the polymer (its footprint) is

reproduced clearly. This ensures that the polymer is uniquely identified.

The pigment's composition combines the best of two traditional pigment worlds: metal-effect and pearlescent pigments. The metallic look and flop of an aluminum pigment has been merged with the functional properties and radiation transmission of a pearlescent pigment.

A Silver Pigment for All Standard Polymers

NIR Silver is available in three degrees of fineness. As a result, different looks are achievable: from an elegant, texture-less silver-gray to a very industrial steel-gray to a shimmering silver-sparkle effect (**Fig. 4**). The pigments are easy to incorporate into all standard polymers. In particular, polyethylene terephthal- »



Fig. 2. The NIR Silver range of metal effect pigments developed by Eckart can be employed in various plastics. The characteristic fingerprints of the various polymers remain detectable. © Eckart

Advantages at a Glance

- Attractive metallic look for plastics packaging
- Pigment composition combines the advantages of metal-effect and pearlescent pigments
- Easy to detect in recycling plants



Fig. 3. Conventional silver pigments interfere with the plastic's specific fingerprint and prevent it from being recognized by sorting systems. In contrast, NIR Silver causes very little interference and this ensures good detectability. © Eckart

ate (PET), low and high density polyethylene (LDPE and HDPE), polypropylene (PP) and polystyrene (PS), which are prime recycling candidates, readily lend themselves to pigmentation with NIR Silver. The pigments are authorized for use in the food-packaging sector. They meet all regulatory requirements on product safety in key regions. Custom coloring in a very wide range of shades and effects is accessible through combinations with both organic and inorganic colored pigments. The degree of gloss and hiding power can be customized as well, thereby providing extensive formulation freedom.

Outlook

Particularly when used in combination with post-consumer recycle (PCR), NIR Silver represents a good opportunity for the packaging industry to reduce its products' ecological footprint and to boost their recyclability. By making recycling easier, NIR Silver is helping to realize a modern circular economy that makes waste available again as secondary raw materials and enables raw materials to be used for as long as possible. ■

Info

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Company Profile

The Eckart Group, an Altana AG company, is a manufacturer of effect pigments. Products from Eckart are used in the paints and printing industry, the plastics and aerated concrete industry as well as in cosmetics and additive manufacturing.

www.eckart.net



Fig. 4. Eckart offers different pigment preparations in the product series that enable a very wide range of silver designs to be implemented. © Eckart