Borosilicate Pigments – Transparency Meets Brilliance and Sparkle

Authors: Katrin Steinbach Dipl. Ing., Dr. Ulrich Schmidt, Eckart GmbH, Hartenstein, Germany

Abstract

Borosilicate pigments represent a new variety in the well-known class of pearlescent pigments. Consisting of transparent borosilicate flakes coated with high refractive metal oxides, e.g. titanium dioxide or iron oxides, these innovative pigments allow the achievement of optimum interference effects in combination with outstanding transparency. Borosilicate pigments open new styling possibilities spicing up colour cosmetics with exciting eye-catching effects.

From State of the Art to Stand-Out

A common feature of all gloss effect pigments is a flake-like structure which enables directional reflection of incoming light and hence, gloss effects[1]. Borosilicate pigments belong to the group of pearlescent effect pigments which are generally composed of low refractive transparent platelets like mica coated with high refractive metal oxides, e.g. titanium dioxide or iron oxides. This structure enables interference effects leading to selective reflection of distinct colours thereby creating the typical pearl lustre as frequently found in nature. Depending on the thickness and the type of the metal oxide coating, pearlescent pigments provide a full range of rainbow colours as well as earth tone and golden colour shades (Figure 1).

For decades natural mica, an alumosilicate mineral with an intrinsic multi-layer structure, was – and still is – used as the state-of-the-art substrate for manufacturing traditional pearlescent pigments. Due to naturally occurring deviations this material unavoidably shows some basic deficiencies. Mainly concerned are variations in the composition, irregular shaped micro-scale platelets with many scattering centres created during the milling process and, furthermore, thickness deviations within single flakes.

Mirage pigments are based on innovative artificial borosilicate platelets with well-defined characteristics. Thanks to excellent surface smoothness, uniform individual particle thickness as well as exceptional transparency, these achromatic flakes represent an ideal substrate for achieving optimum pearlescent effects.

The superior visual appearance of the new borosilicate pigments compared to traditional natural mica based pearlescent pigments stands out in a microscopic view (see Figure 2 on page 145).

The titanium dioxide coated mica pigment with red interference colour on the left hand side shows a significant colour deviation from particle to particle caused by the background colour of individual mica flakes and by inhomogeneous metal oxide coating layer thickness. In contrast, the titanium dioxide coated borosilicate flakes on the right hand side appear in an almost uniform red colour, due to the achromatic nature of the artificial substrate and due to the homogenous thickness of the metal oxide coating achieved by superior coating technology.

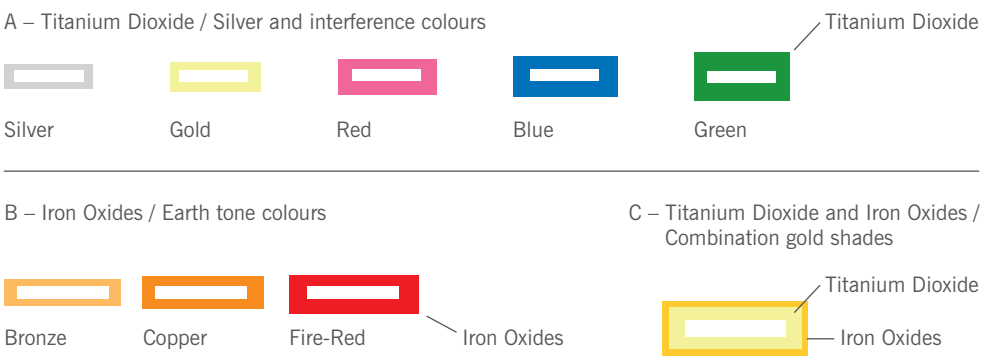

Figure 1. Pearlescent pigments – a kaleidoscope of colours