Colored aluminium paste

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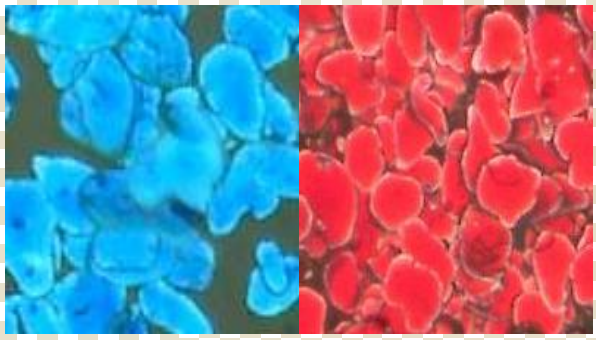

Optical micrographs of colored aluminium paste

【 1. Introduction 】

The finish of the deep colored metallic coating used on cars and motorcycles and also on personal computers and home electronics is required to have a high quality feel with a superior feeling of brightness and vividness of color (high chroma).

Conventional colored metallic coating films which use a mixture of aluminium paste and organic pigment need a large amount of organic pigment to raise chroma, because there is a large amount of white light which is reflected by aluminium flakes in the coating film.(See Fig. 1.) However, when the amount of the organic pigment is increased to obtain a high chroma, brilliance and metallic feeling are reduced, because the scattering of light by the organic pigment particles present in the coating is increased. Furthermore, when the amount of scattered light increases, there is also a reduction in the flip-flop feeling (the property of the brightness changing depending on the angle of viewing), which is a distinguishing characteristic of metallic coatings. Therefore, if the feeling of brightness of the coating film is to be maintained, then the amount of organic pigment must be restricted, so there is a limit to chroma that can be obtained. There is therefore a trade-off between the brightness feeling and chroma.

【 2. Features of the colored aluminium paste 】

Toyo Aluminium has developed the "Friend Color™" product, which is colored aluminium paste made by coloring aluminium flakes with pigment. The Friend Color™ product with the highest chroma and greatest feeling of brightness at the current time is the New D Series. A schematic drawing of the structure of this product is shown in Figure 2.

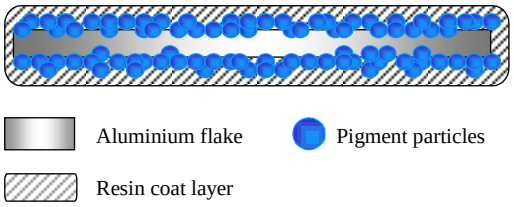

Fig. 2 Schematic diagram of colored aluminium paste

As shown in the figure above, in the structure of the colored aluminium paste, the surface of an aluminium flake is covered evenly with organic pigment particles and then resin is coated on top to fix the organic pigment particles onto the aluminium flake. This structure means that the organic pigment particles do not separate from the aluminium flakes and cause color segregation. (Fig. 3)

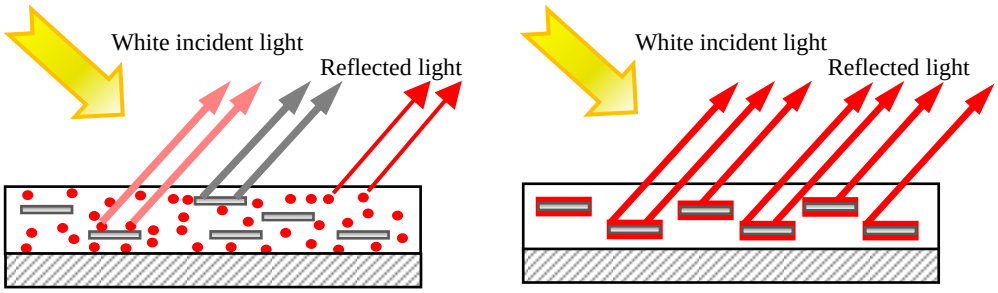

Fig. 1 The state of reflected light on a coating film produced by mixing aluminium paste and organic pigment (left) and on a coating film produced using colored aluminium paste (right)

Furthermore, the light reflected on the aluminium flake surface is not white light, because aluminium flake surface is covered with an organic pigment uniformly. Therefore, all light coming out of the coating film passes through the pigment and is colored. This means that it is possible to achieve a high chroma coating film with a smaller amount of organic pigment than when aluminium paste and organic pigments are mixed. In addition, as shown in Figure 4, the amount of scattered light is reduced because the organic pigment particles do not exist alone in the coating film. As a result, the flip-flop nature that is the characteristic of metallic coatings is maintained, so the reflected light is strong in the highlight direction (specular direction) and weak in the shade direction (slanted direction). By using colored aluminium paste, it is therefore possible to realize a colored metallic coating with high chroma and high design performance, without losing the feeling of brightness of the aluminium flakes.

【 3. Summary 】

Friend Color is a unique coloring material that is colored aluminium paste produced by coating the surface of aluminium flakes with organic pigment. The use of Friend Color makes it possible to easily obtain a high design performance colored metallic coating film with high chroma and high glitter.

In the future, in addition to expanding from coatings and inks to include other sectors, consideration will also be given to the application to other fields of the unique composite material technologies developed for this aluminium paste.

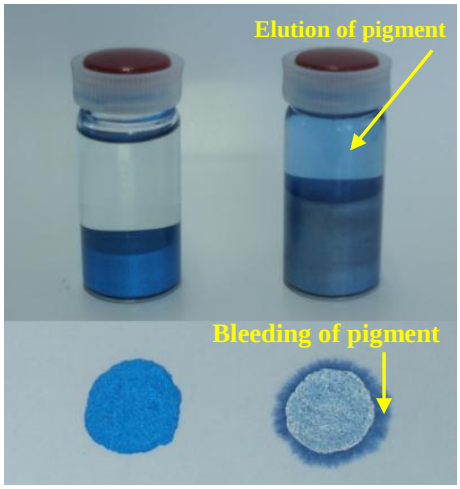

Fig. 3 Comparison of colored aluminium paste (left) and mixture of aluminium paste and organic pigment (right)
(Top: The state when dispersed in organic solvent and settled. Bottom: The state when dispersion liquid is dripped onto water-absorbing paper.)

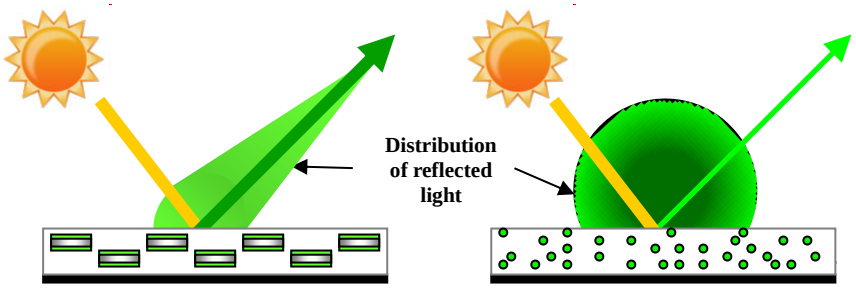

Fig. 4 Comparison of reflected light distributions on coating film using colored aluminium paste (left) and coating film with solid color (right)