Realization of Gold-Alloy Shades in Powder Coatings

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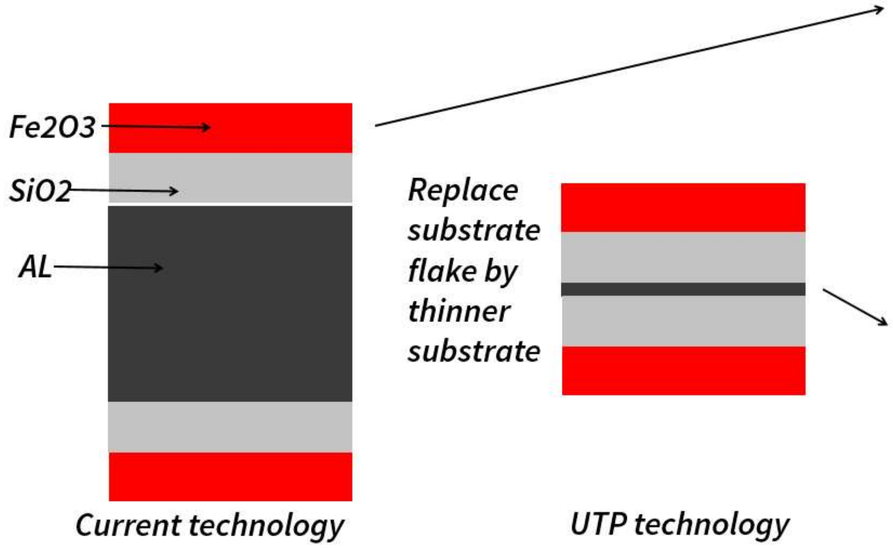
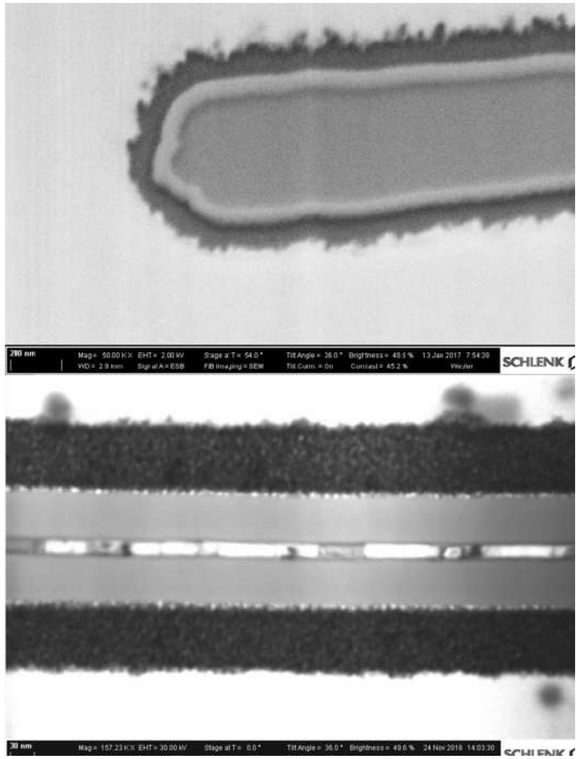
Presented by: Karen Schneider, Schlenk Metallic Pigments

Pigment composition

New
Metal-Interference pigment
(Particle-Design: Ultra thin pigment)

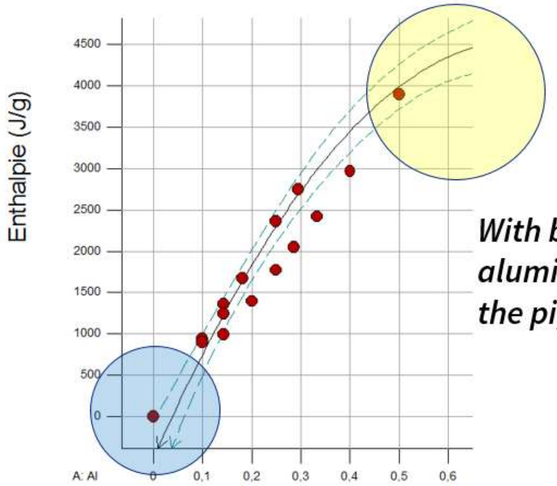




Effect Pigments on Human Hair (© by Dr. Ralf Webler, Schlenk)

Safety

Lower aluminum content greatly reduces free enthalpy



Current technology

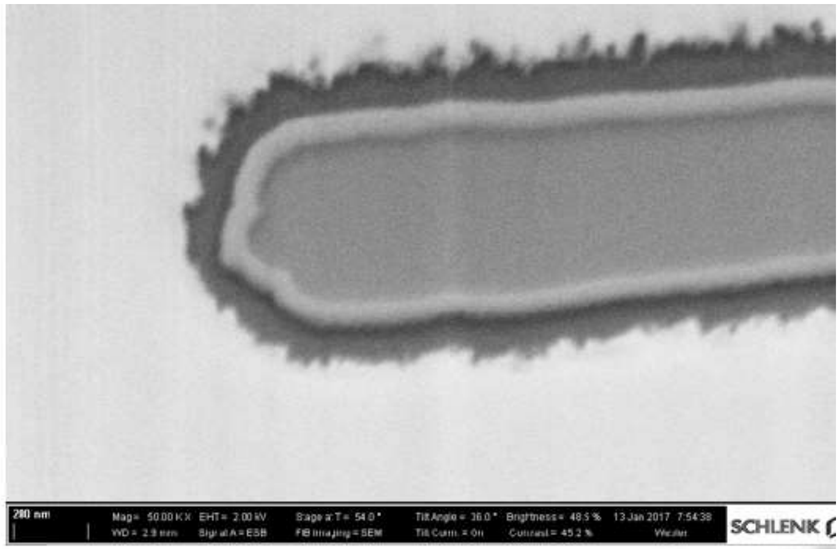
With below 15% aluminum content, the pigment is safe

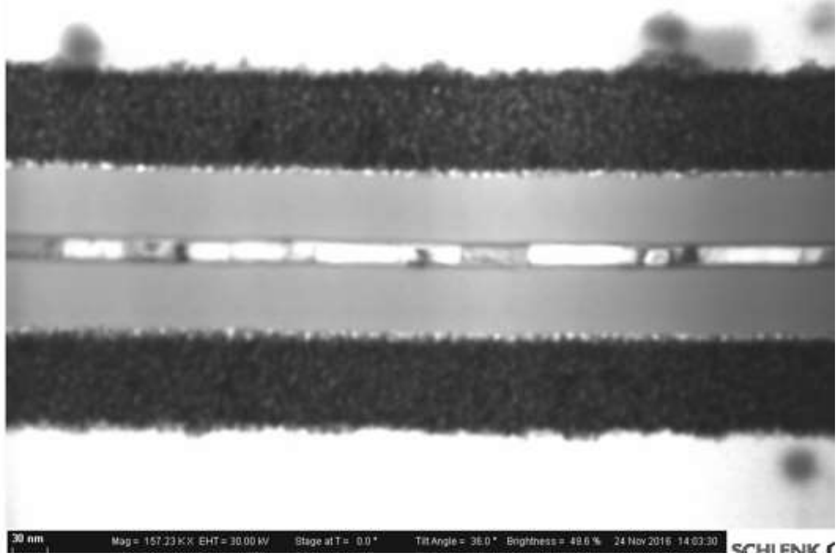
Ultra thin technology

Behavior in thermite test

Pigments also tested by

BAM
Bundesanstalt für Materialforschung und -prüfung





Overview of Ultra Thin Technology

Ultra thin pigments are not dangerous according to the dangerous goods regulations and not classified according to the CLP regulation.

- No dust explosion
- No self-ignition
- Non-dangerous good, according to IATA regulation easy to transport
- Possible to sell as powder (no solvent needed)
- Packaging and storage more convenient

Pigments also tested by

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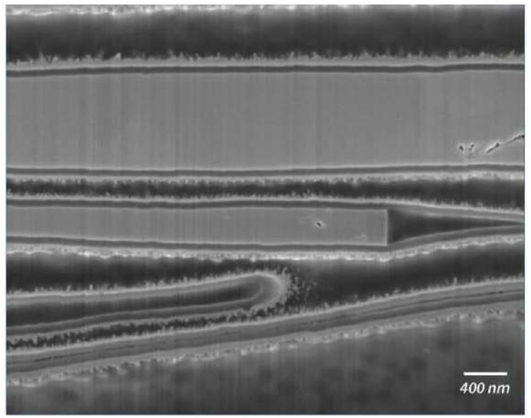
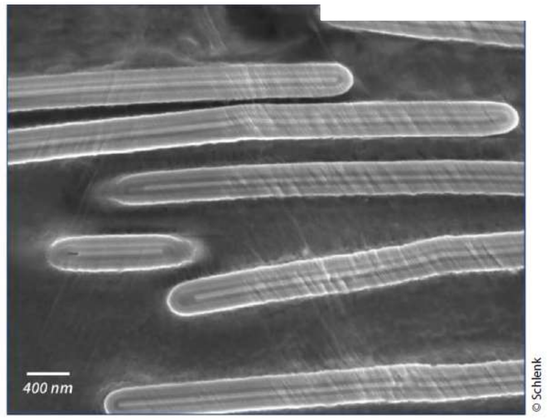


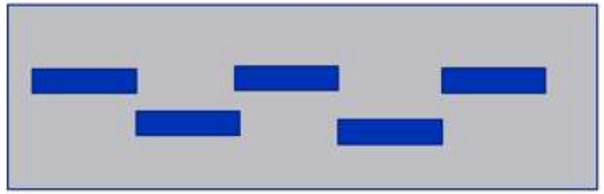


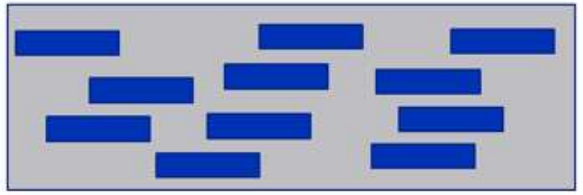
© Schlenk

Querschnitt durch konventionelle Metallinterferenzpigmente (links) und durch die neue Generation basierend auf der UTP-Technologie (rechts).

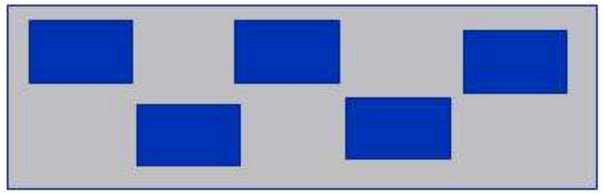
Pigment Orientation

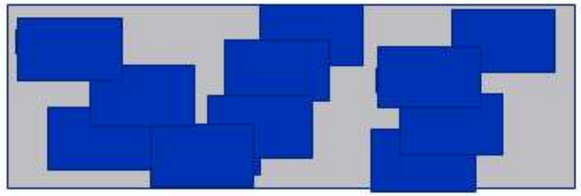
Ultra ThinTechnology

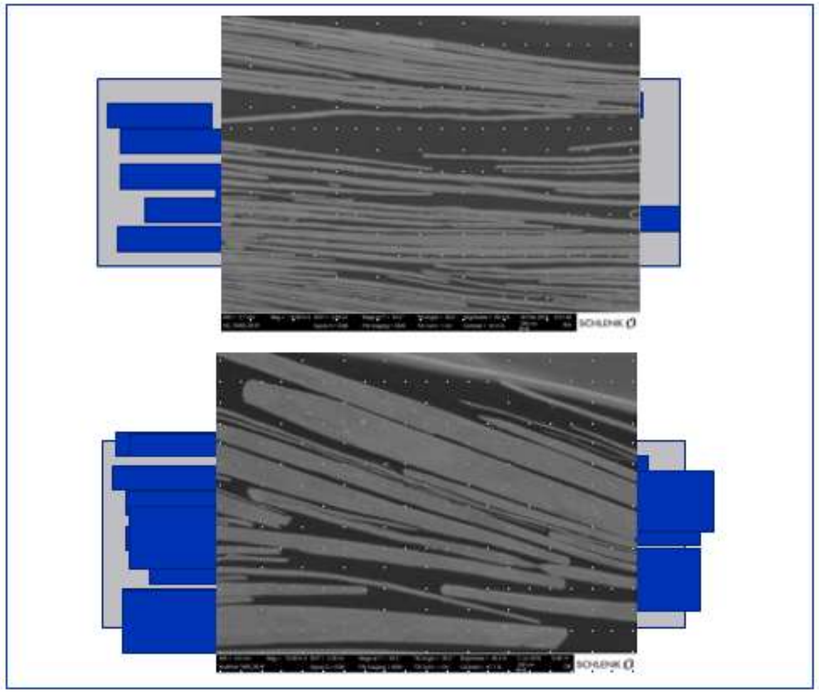




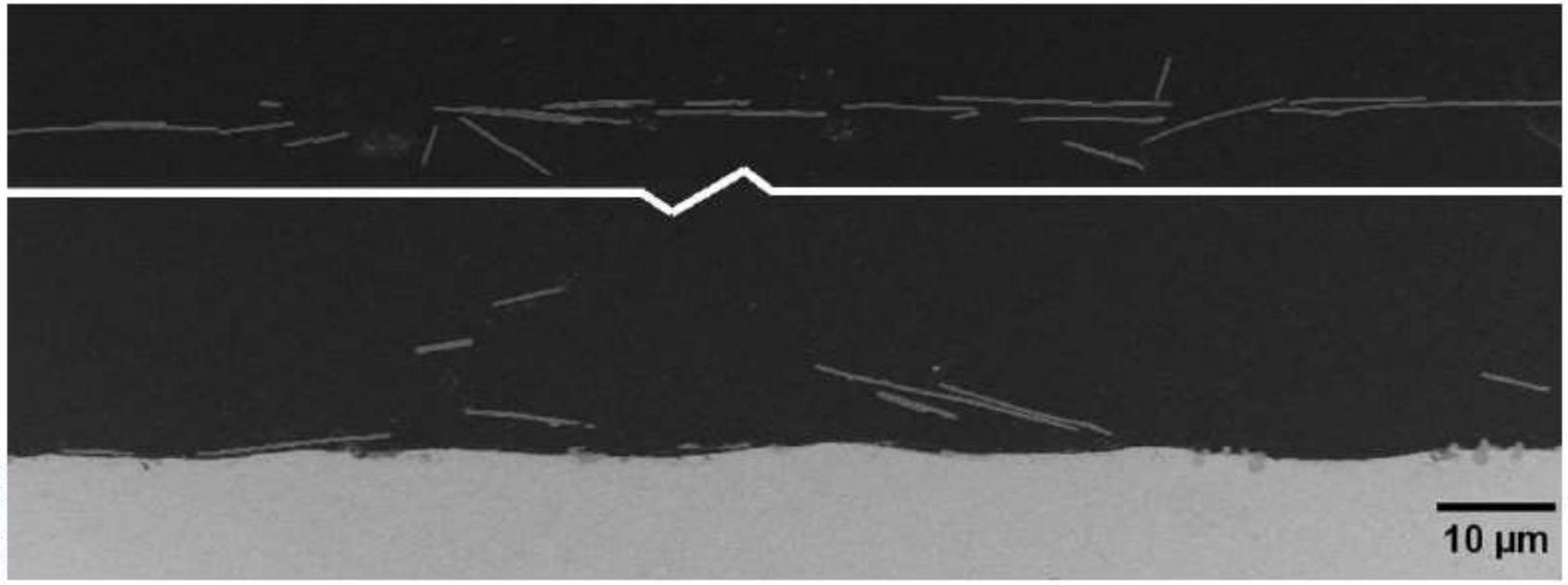
Standard FeO_2 Coated Aluminum







Pigment orientation: Powder coatings



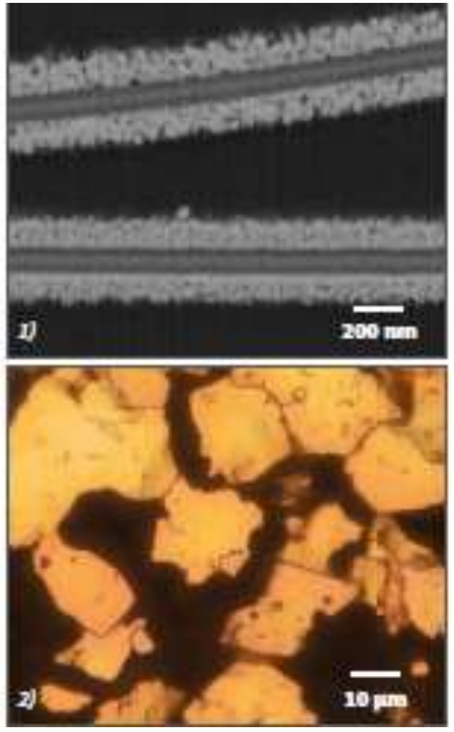
Der Bereich oberhalb der weißen Linie im REM-Querschnitt illustriert die hohe Partikel-Präsenz sowie die homogene Teilchenverteilung an der Pulverlackoberfläche.

Ultra thin technology

Standard FeO_2 coated aluminum

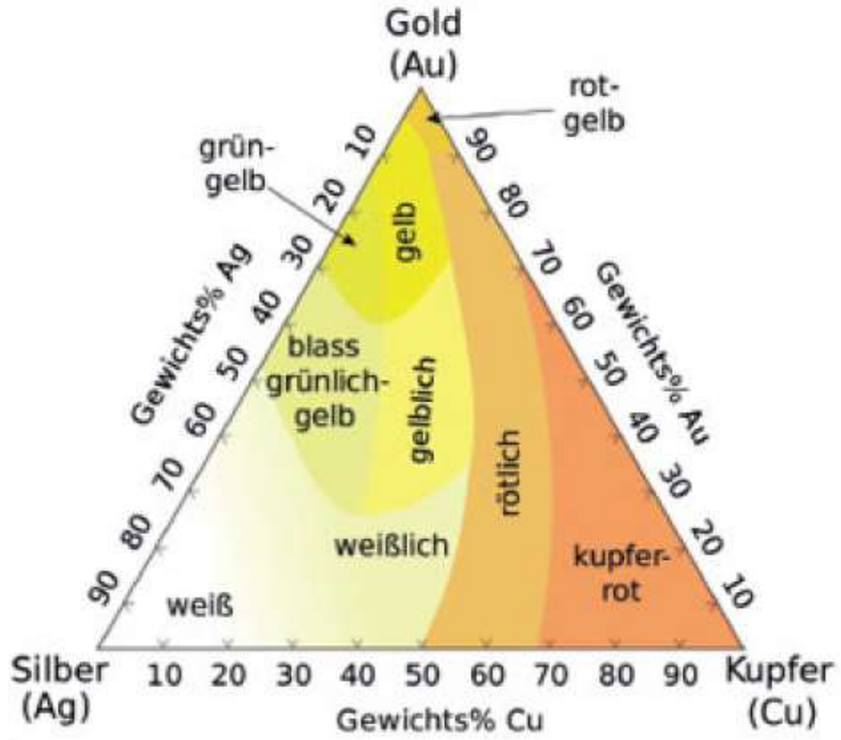
Application in powder coatings (example: pure color shades)

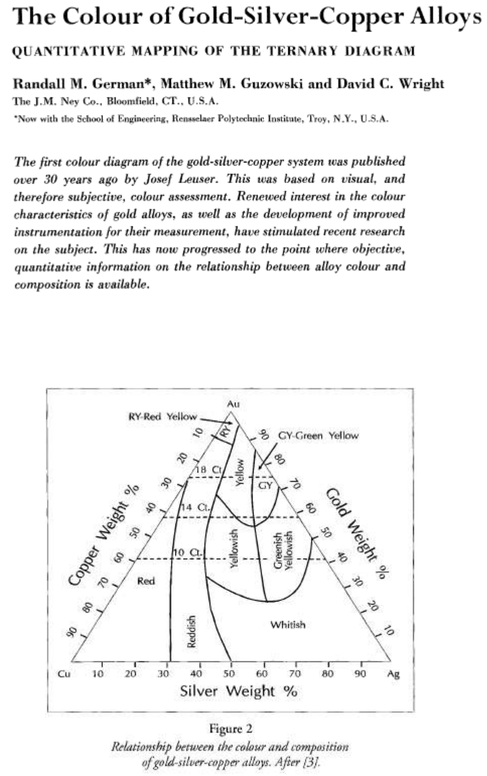
Das pulverlackierte Designobjekt visualisiert den ausgeprägten Hell-Dunkel-Flop.



1) Electron microscopy (cross-cuts)
2) Light microscopy (top view)
3) Impressive color / lightness travel on demo object (powder coated)

Precious metal and alloys (Gold-Silver-Copper)





The Colour of Gold-Silver-Copper Alloys

QUANTITATIVE MAPPING OF THE TERNARY DIAGRAM

Randall M. German*, Matthew M. Guzowski and David C. Wright
The J.M. Ney Co., Bloomfield, CT., U.S.A.
*Now with the School of Engineering, Rensselaer Polytechnic Institute, Troy, N.Y., U.S.A.

The first colour diagram of the gold-silver-copper system was published over 30 years ago by Josef Leuser. This was based on visual, and therefore subjective, colour assessment. Renewed interest in the colour characteristics of gold alloys, as well as the development of improved instrumentation for their measurement, have stimulated recent research on the subject. This has now progressed to the point where objective, quantitative information on the relationship between alloy colour and composition is available.

Figure 2
Relationship between the colour and composition of gold-silver-copper alloys. After [3].

3 J. Leuser, *Metall,* 1949, 3, 105-10, 128

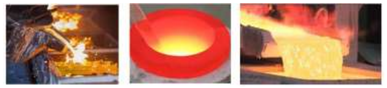
Coloured Gold Alloys

Cristian Cretu and Elma van der Lingen
Minitek, Private Bag X3015, Randburg 2125, South Africa

Dedicated to the memory of William S Rapson
Received 7 September 1999

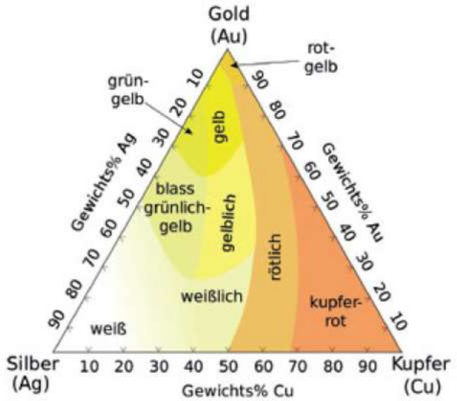
Figure 1 *Jewellery pieces produced by using coloured gold alloys. By courtesy of Jenna Clifford*

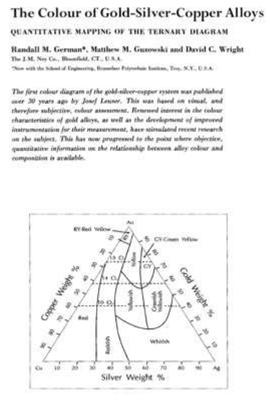
SCHLENK: Effect Pigments



© Wikipedia

Color shades: From the alloy to the effect pigment mixture





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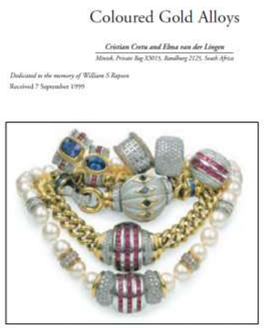

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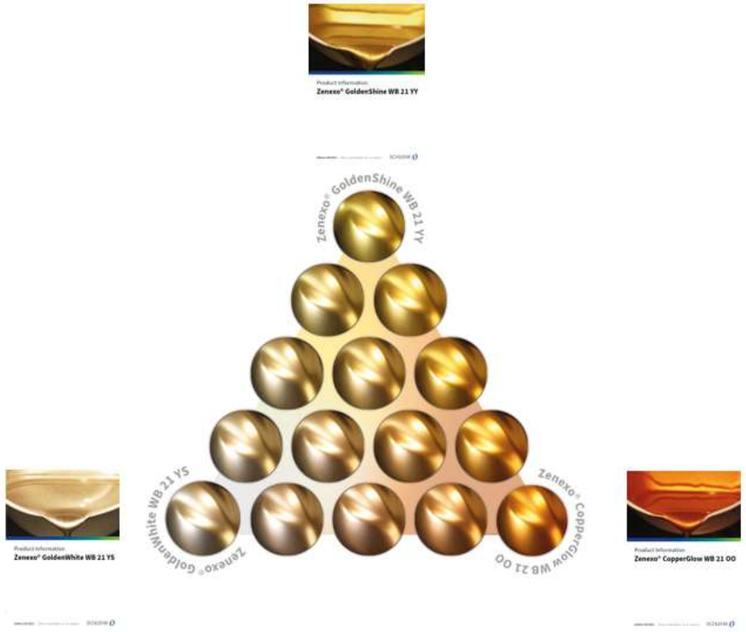
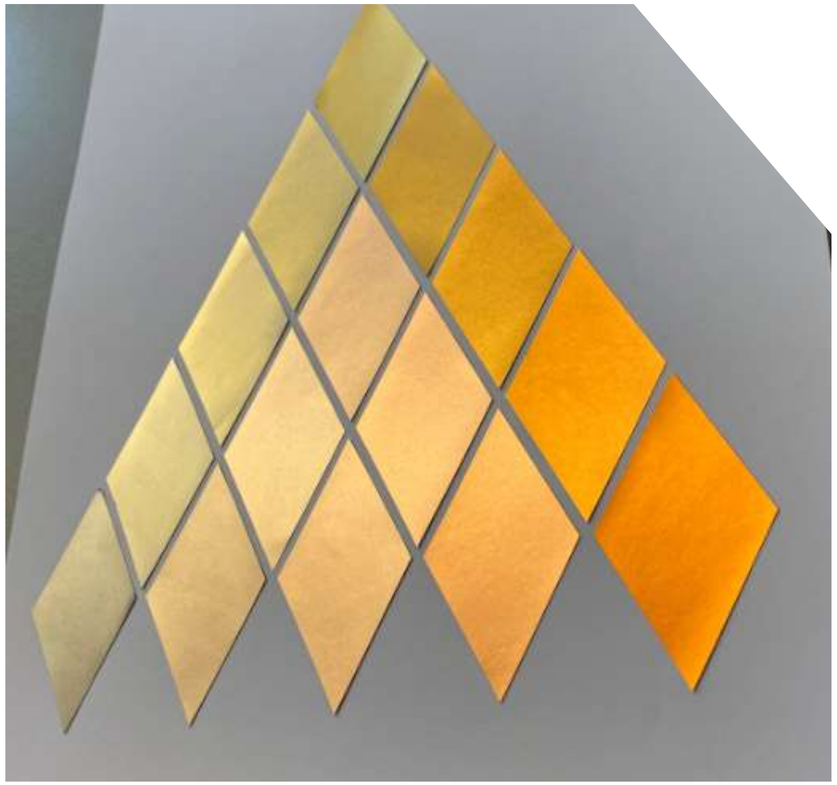


…Übertragung der Metall-Legierung hin zur Effektpigment-Mischung…

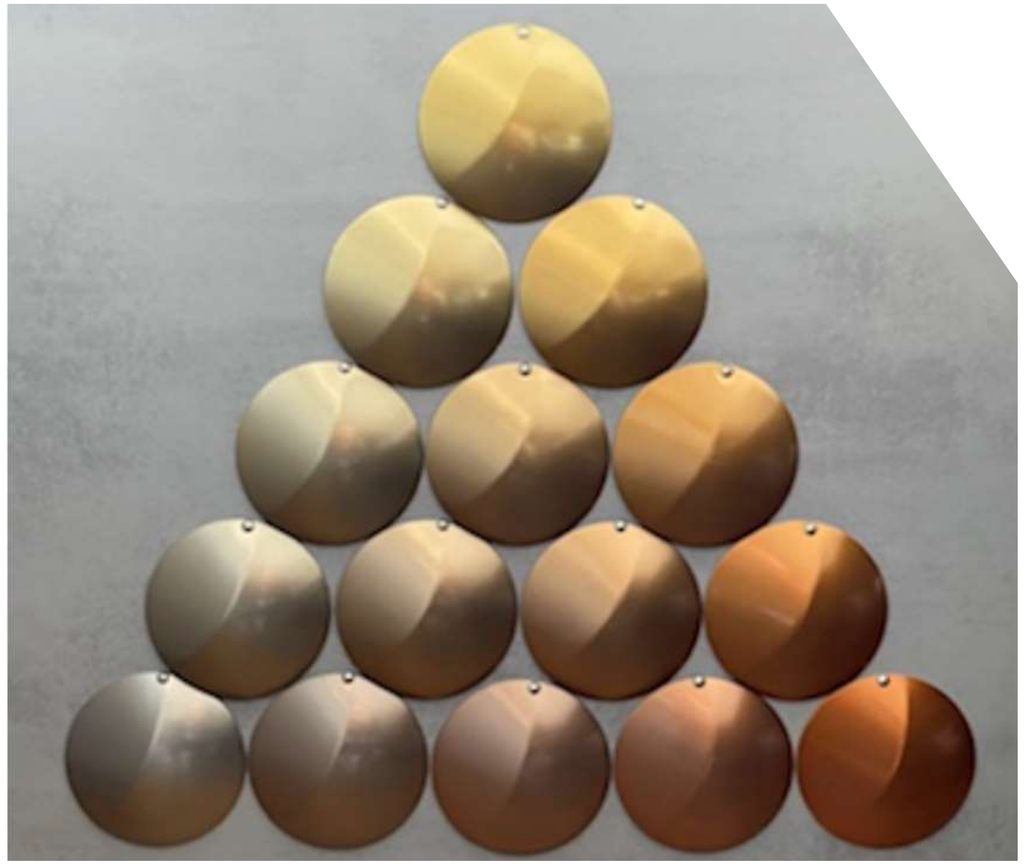
Color shades: From the alloy to the effect pigment mixture



Liquid

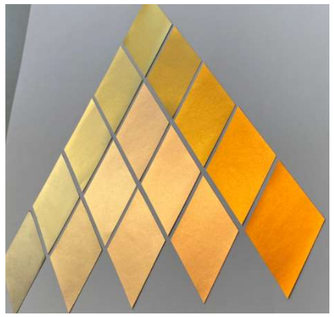
Powder

Color shades: From the alloy to the effect pigment mixture



Powder Coating application

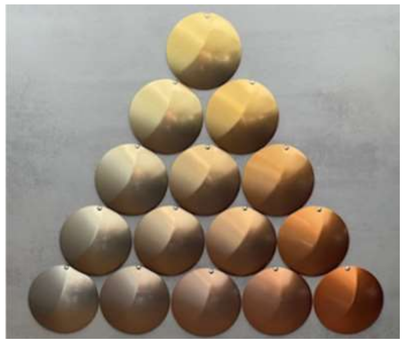
Comparison: Macroscopy - Microscopy



Liquid

…light microscopy by different resolutions…

Comparison: Macroscopy - Microscopy



Powder

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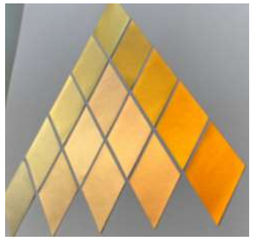
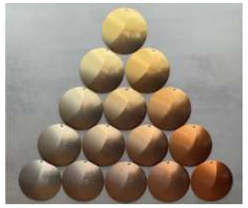


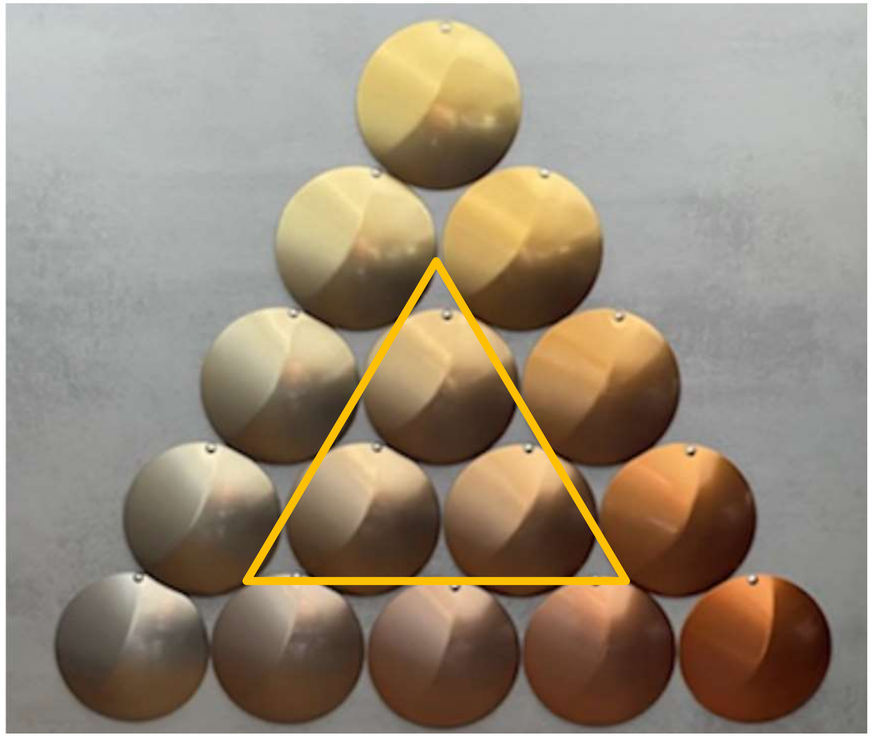
Wet- paint use



Powder Coating use

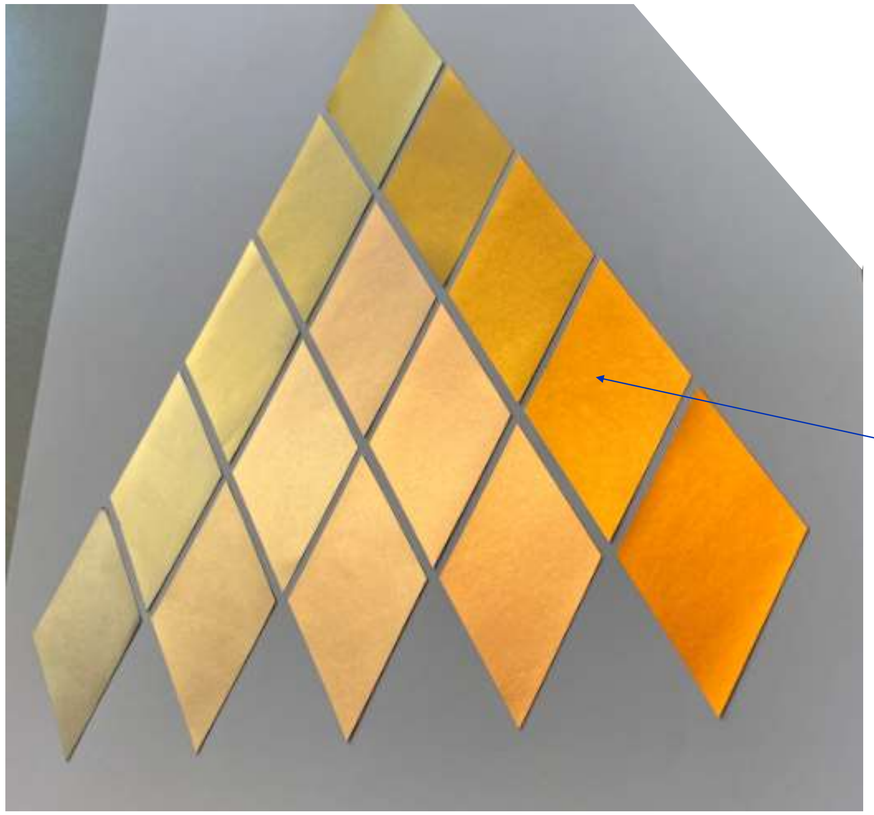
…light microscopy by different resolution…

Shade-Comparison: Test series in powder coat



Powder Coating use

Color shades: From the alloy to the effect pigment mixture



E-papers available

It is known from metallurgy, that different color impressions can be realized by admixture of copper, silver and gold (Au-Ag-Cu), as explained in the scheme beside.

SCHLENK has succeeded in transferring this principle, which is based on metals and through alloying, to the world of effect pigments, the ZTS - Zenexo® Ternary System (**YY-YS-OO**).

Using the individual effect pigments or defined mixtures of Zenexo® GoldenShine WB 21 **YY**, GoldenWhite WB 21 **YS** or CopperGlow WB 21 **OO**, it is now possible to realize similar color shades in coatings, printing inks or plastics previously known only from the field of (semi-) precious metals.

ZENEXO® GoldenShine WB 21 **YY** can be used in the formulations of these applications both as a sole effect pigment and in combination with the other ZENEXO® effect pigments to adjust a desired shade.

For details on color mixing please ask for our brochure *The Zenexo® Ternary System* available as e-paper or hardcopy.

For more general scientific background please ask for our publication *A. Huber, F.J. Maile, European Coatings Journal, 3/2021* available as PDF or hardcopy.

ZTS
The Zenexo® Ternary System

If you are interested in color stylings with Zenexo® UTP, please contact stylings@schlenk.de.

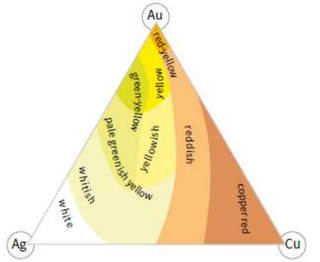
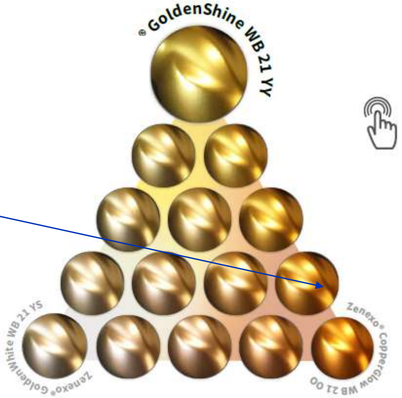


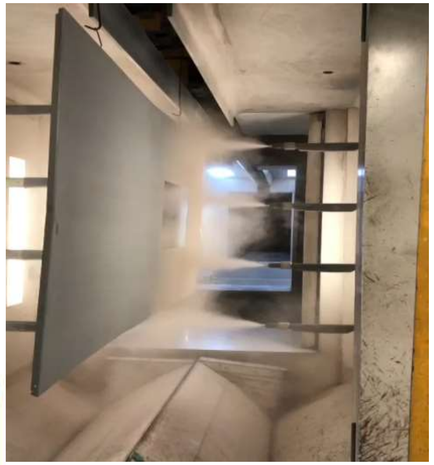
Figure left:
Scheme of the mixing triangle based on metallic gold, silver and copper [source: https://commons.wikimedia.org/wiki/File:Ag-Au-Cucolours-german.svg]

Below:
Transfer to the Zenexo® effect pigment domain (ZTS - Zenexo® Ternary System, YY-YS-OO), shown with painted objects. The mono-pigmented shades are located at the corner points, all others contain mixtures of Zenexo® corner point pigments.



Color comparison: Test series by powder coating industrial application conditions

Video



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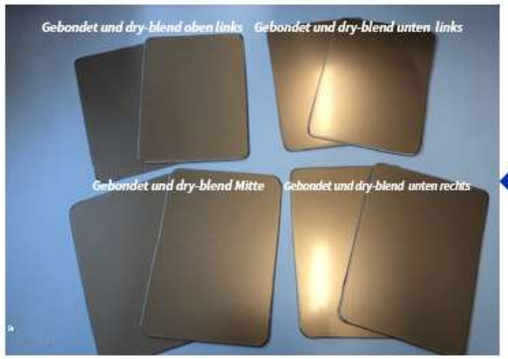
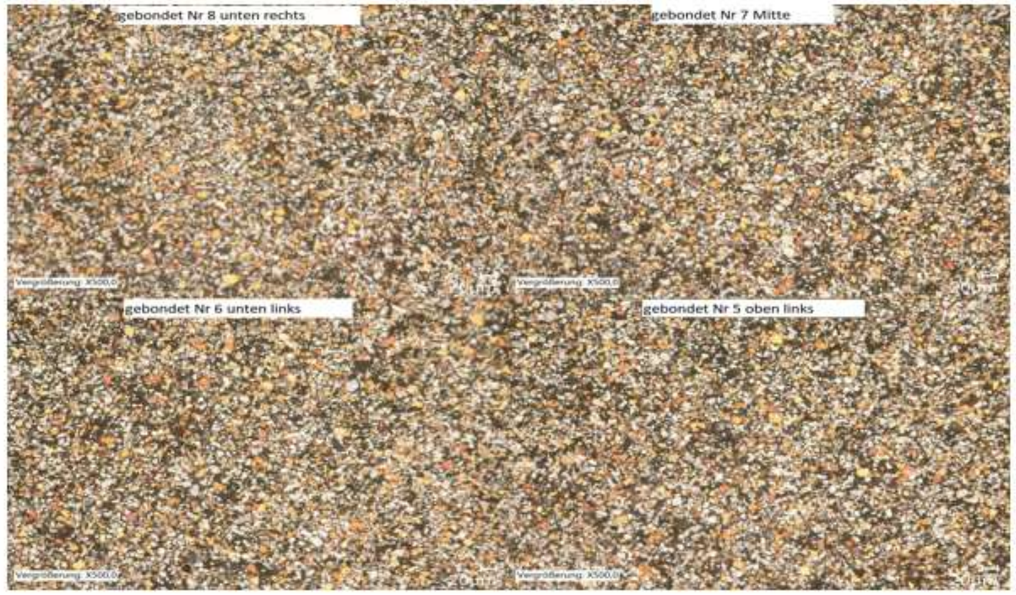
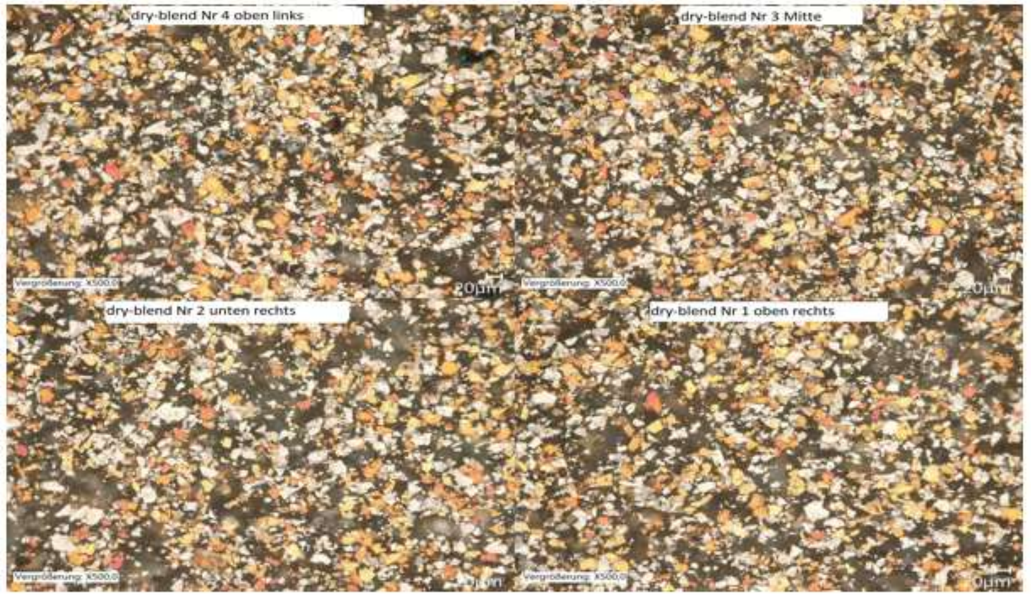


Effect-comparison: Test series in powder coating



4 corner & center cut – bonded panel

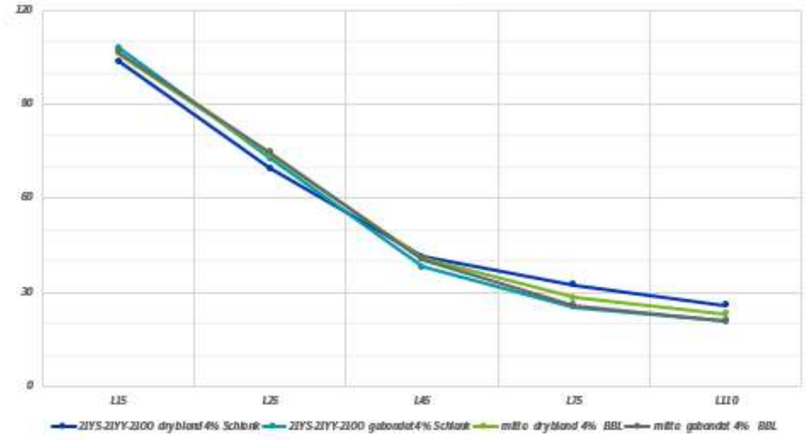


4 corner & center cut – dry blend panel

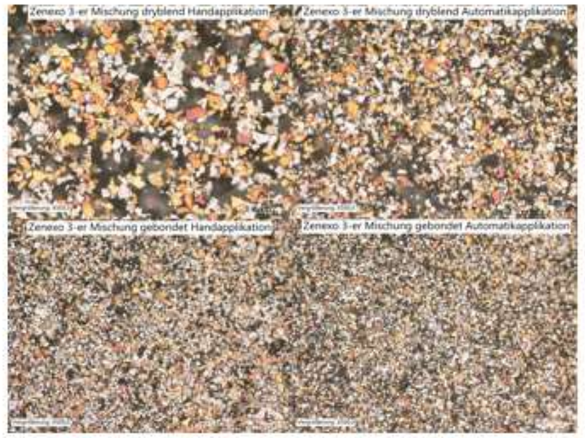
Effect-comparison: Test series in powder coating

Comparison: measurement data bonded/dry-blend applied by hand and automatic equipment

Geo	L*15	L*25	L*45	L*75	L*110
21YS-21YY-21OO dry blend 4% Schlenk	103,59	69,53	41,58	32,59	26,09
21YS-21YY-21OO gebondet 4% Schlenk	108,10	72,70	38,10	25,50	20,80
mitte dry blend 4% BBL	106,09	73,90	41,00	28,45	23,22
mitte gebondet 4% BBL	106,65	74,71	40,75	26,01	21,05

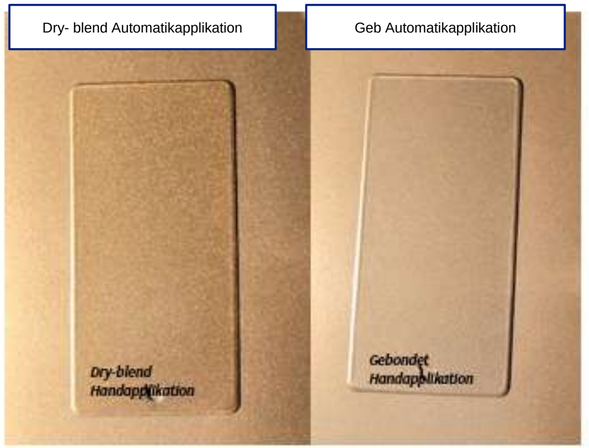


Lab Industrial



Dry

bonded



Questions?

Thank you for your attention!

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