Paints & Coatings

Reduced complexity, improved performance in waterborne formulations: inherently matte acrylics and cationic functionality without compatibility issues

Dr. Fabian Gyger
Global Product Manager
Paints & Coatings Division

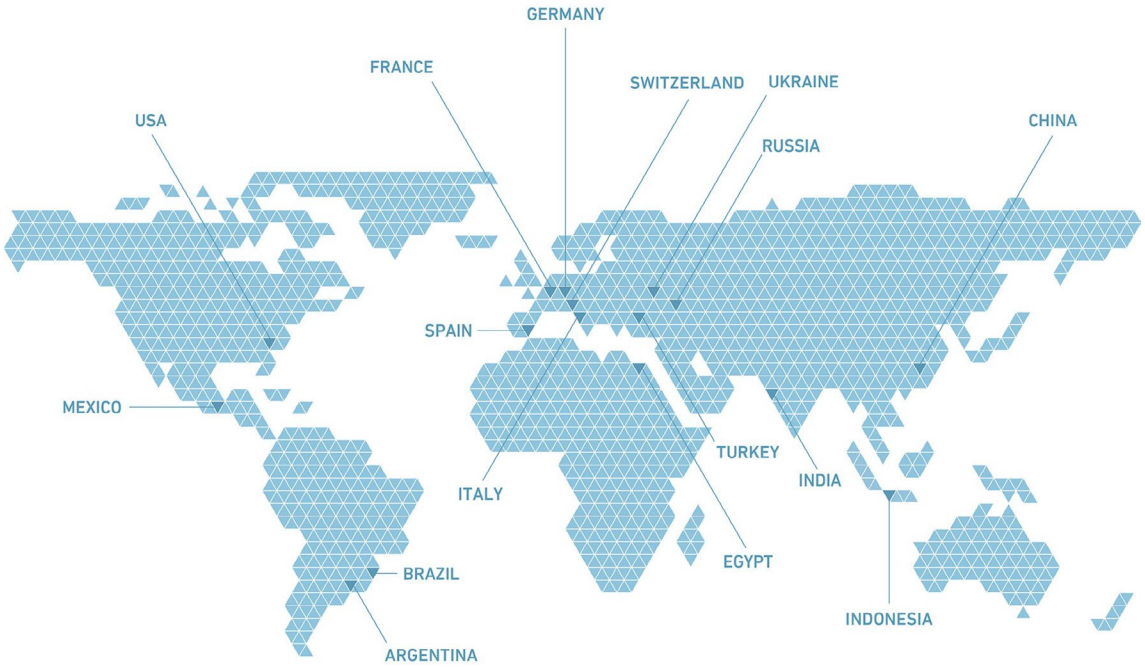
ZSCHIMMER & SCHWARZ

Chemistry tailor-made

- Founded 1894, in Germany
- Headquarters in Lahnstein, Germany
- A global supplier of tailor-made chemical auxiliaries and specialities
- A broad product portfolio for a wide range of applications
- More than 1,500 employees
- Group revenue of approx. €600 million (~$700M) in 2020

A global player with a world-wide presence

- **30** subsidiaries in **17** countries on **5** continents
- **22** in-house production facilities



Business Divisions

PERSONAL CARE

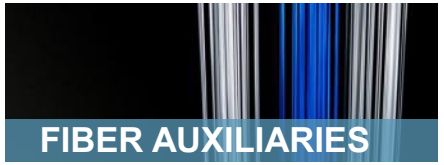
Product solutions for:
Hair & body, toiletries, color cosmetics

LEATHER AUXILIARIES

Fatliquors/tanning agents and specialities for:
Automotive, furniture, shoe and bag leather

CERAMIC AUXILIARIES

Chemical auxiliaries for:
Tiles & glasses, sanitary and table ware, tiles printing, powder metallurgy



FIBER AUXILIARIES

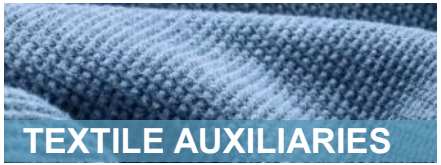
Spin finishes and specialities for:
Filament yarns, fibers, nonwovens

CLEANING SPECIALITIES

Surfactants, polymers and phosphonates for:
Home and automotive care, industrial cleaning

INDUSTRIAL SPECIALITIES

Product packages
made from surfactants, phosphonates, esters, polymers

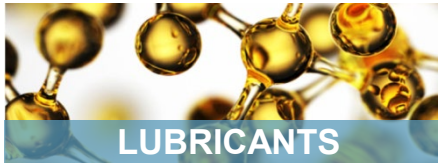


TEXTILE AUXILIARIES

Textile auxiliaries for:
Pre-treatment, dying, finishing and coating

PAINTS & COATINGS

Surface treatments for:
Metal, wood, paper, textiles, concrete



LUBRICANTS

Synthetic ester oils for:
Industrial, automotive, and aviation lubricants

Paints & Coatings Division

- Various technologies and materials for surface treatment of metal, wood, paper, textile and concrete
- Environmentally sound, innovative water-based polymers tailored specifically to each individual application
- Wide product range – from raw materials to formulated customer solutions – produced in Europe, Asia and North America

Paints & Coatings

MANUFACTURING SITES

Global presence

Louisville, KY | US

Canton, MA | US

Brueggen-Bracht | DE

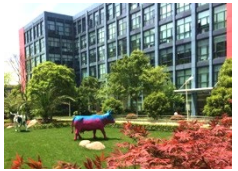
Lahnstein | DE

Wissembourg | FR

Milledgeville, GA | US

Ivey, GA | US

Yesan-gun,
Chungcheongnam-do | KR



Shanghai | CN

Paints & Coatings

MARKETS

Industrial coatings

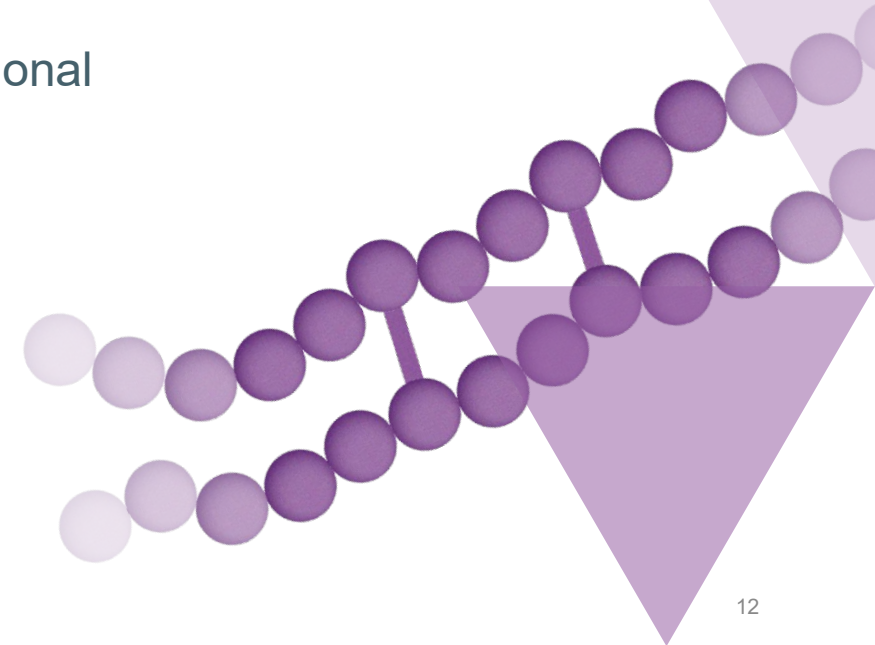
- Wood
- Metal protection and coatings
- Concrete
- Plastics

Graphic arts – printing industry

- OPV/Primer
- Paper coatings
- Printing inks

Z&S polymer technologies

- Water-based acrylics
- Proprietary technologies for multiple coating applications based on anionic and cationic polymers
- Improved performance compared to traditional acrylic emulsions
- Developed by Z&S, tailored to the needs of the customer



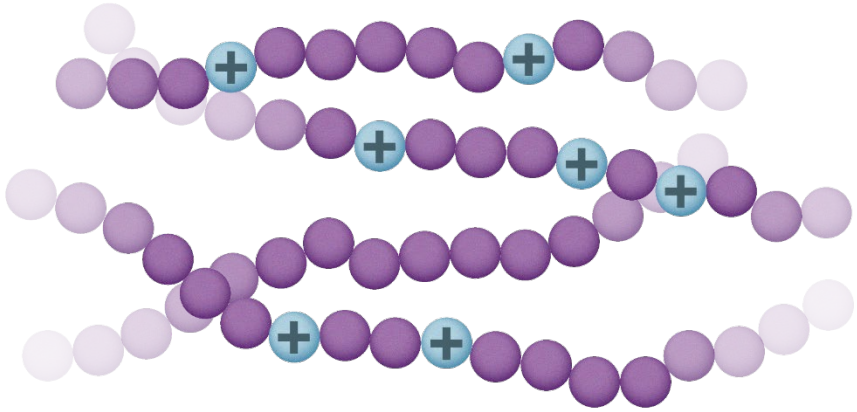
Paints & Coatings

POLYMERS WITH INTERPENETRATING NETWORK

Cationic technology

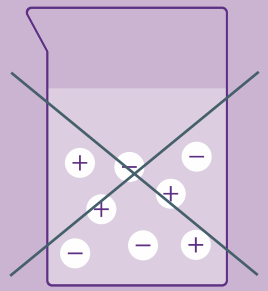
Description

- Polycationic systems with optimum acidic pH range and high charge density
- Complexation of anionic structures like wood extractives or water stains offer superior stain blocking for pigmented and clear coatings
- Low particle size with good penetration into the substrates for good adhesion and protective effects

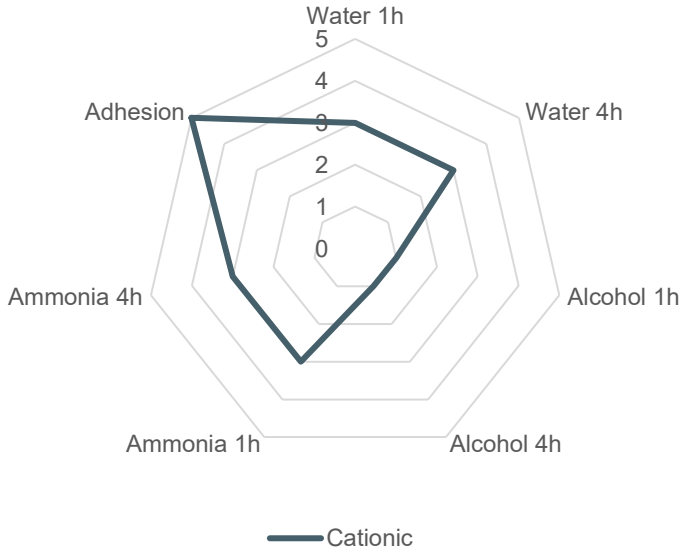


Cationic technology – disadvantages

Low overall resistance and incompatible with anionic ingredients



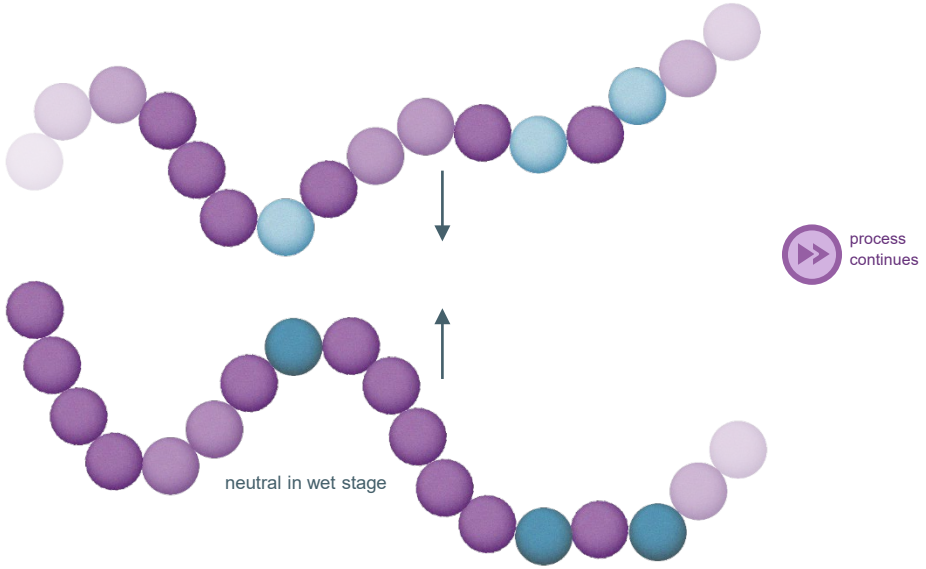
Cationic and anionic components cannot be mixed / combined.



Interpenetrating polymer network (IPN)

Description

- Two different ionic structures in the same polymer network at a neutral pH
- Overall anionic behaviour paired with cationic functionalities
- Benefits of a cationic acrylic without the usual compatibility issues



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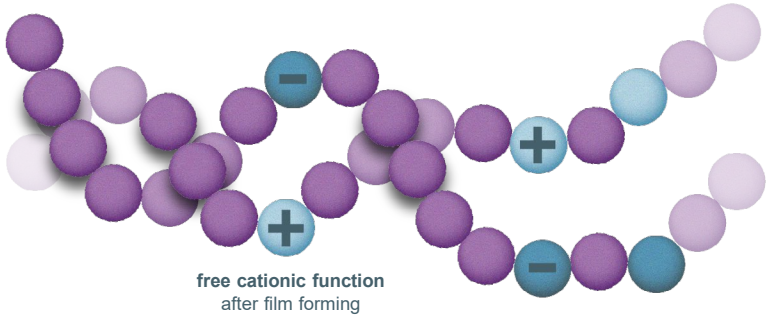
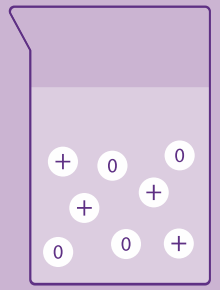


free cationic function
after film forming

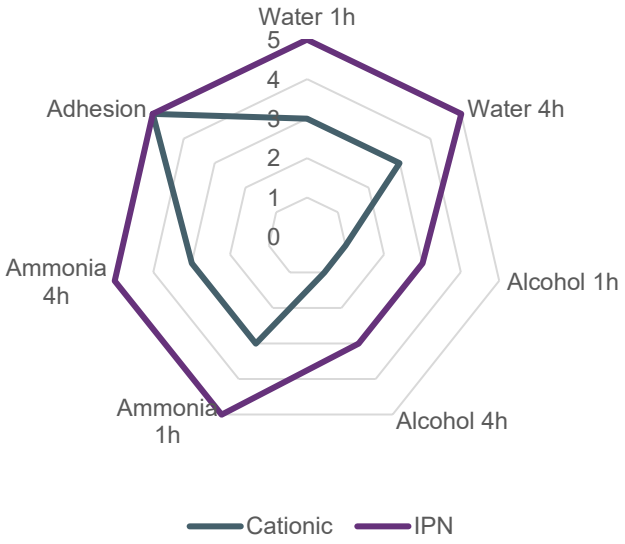
IPN technology and the difference to cationic technology

Good resistance and compatible with anionic ingredients

Cationic and anionic components can be mixed / combined.

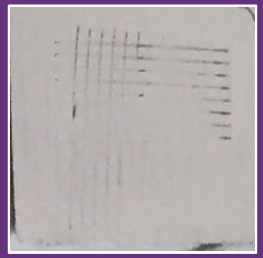


Combined mixture



Crosshatch adhesion testing

White primer based on:

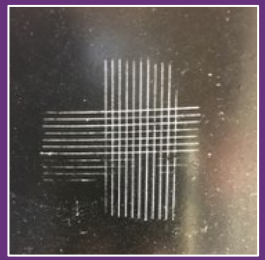


DI16019-21 over black PVC

DI16019-21 over cold-rolled steel

DI16019-21 over oak wood

Clear primer based on:

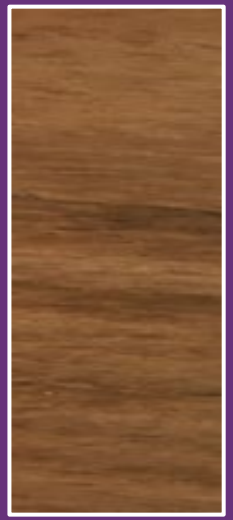


DI16019-21 over black PVC
(rating = 5B)

DI16019-21 over cold-rolled steel

DI16019-21 over oak wood

Wood tannin migration study*



Quadrant 1
uncoated cherry

Quadrant 2
wood coated with
standard white paint

Quadrant 3
wood coated with
DI16019-21 white primer,
then standard white paint

Quadrant 4
wood coated with
DI16019-21 clear sealer,
then standard white paint

*after 1 month of aging at room temperature

Stained drywall migration test

Stage 1

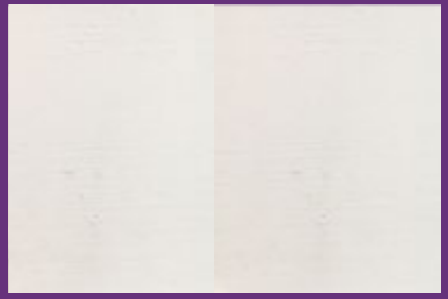
Old stained drywall
(photo taken before priming)

Stage 2

2 coats of white primer based on DI16019-21 (photo taken after 2 weeks)

2 coats of commercial white primer

Stage 3



No additional coats after stage 2 (photo taken after 2 weeks)

1 coat of primer based on DI16019-21 on top of commercial primer

Stage 4

1 coat of commercial yellow paint
(photo taken after 3 months)

Interpenetrating polymer network (IPN) – dye, stain & tanning blocking

Effect

- Excellent tannin, stain and dye blocking
- Excellent adhesion to multiple substrates like aluminium, PVC and wood
- High compatibility with other resins & additives
- Zero VOC requirements to formulate coatings

Wood coatings

Primer for graphic arts

Blocking of wood extractives, water-soluble dyes

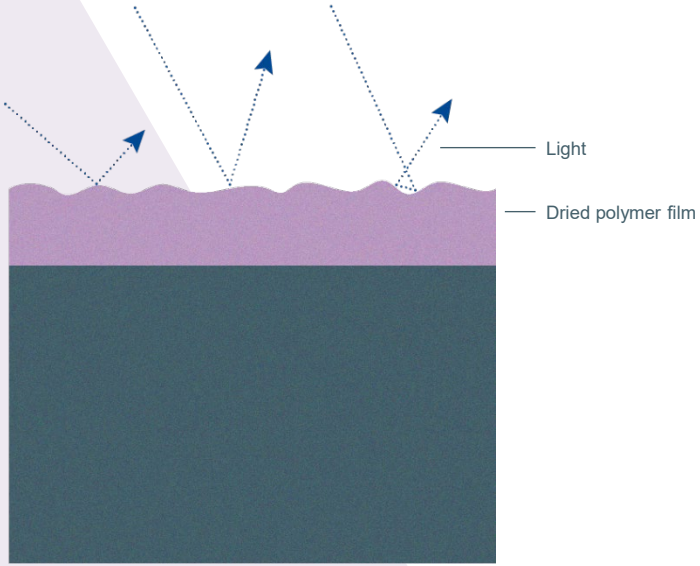
- Very good isolation of water-soluble substances, wood ingredients, dyes, etc., quick drying at RT, good water resistance
- DI16019-21
  - S.C: 40%; MFFT: 10 °C; pH: 7
- SYNTRAN® AC 6130
  - S.C: 40%; MFFT: 52 °C; pH: 8.8

Paints & Coatings

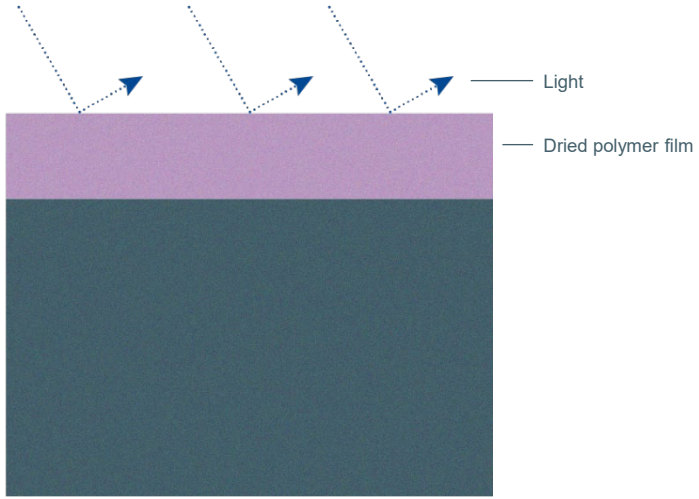
INHERENTLY MATTE TECHNOLOGY

Light scattering effect – matte coatings

„Dull“ dried polymer film



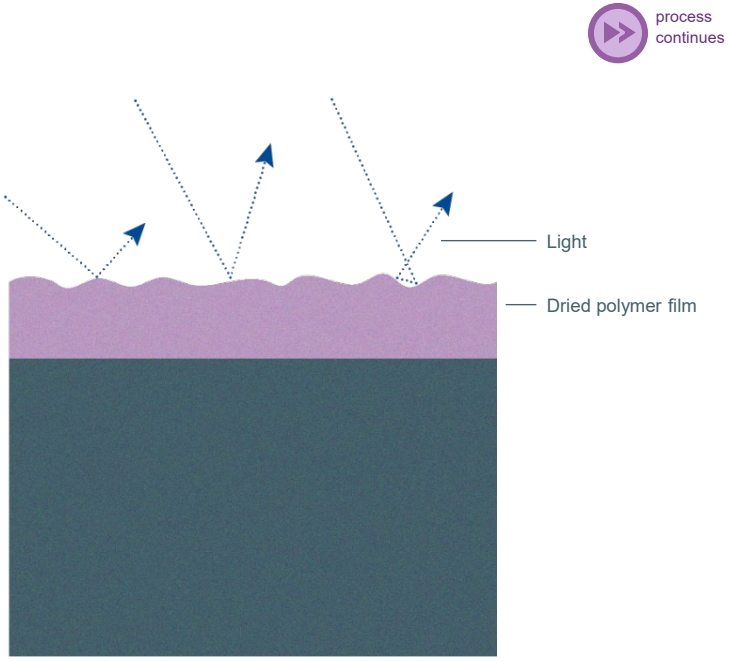
“Glossy” dried polymer film



Inherently matte technology

Description

- Proprietary manufacturing process that creates an inherently dull acrylic polymer
- Film with low gloss, flexibility and excellent stability; this technology also allows for excellent adhesion on multiple substrate types
- This matte polymer is not a “liquid matting agent”! → Has to be formulated as a conventional (water-based) acrylic polymer
- For use as a single binder or in a mixture with polyurethanes



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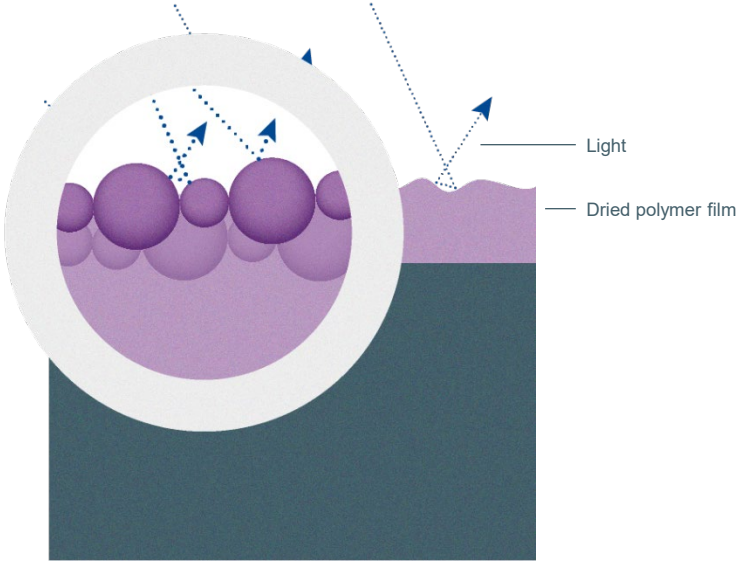


Inherently matte technology

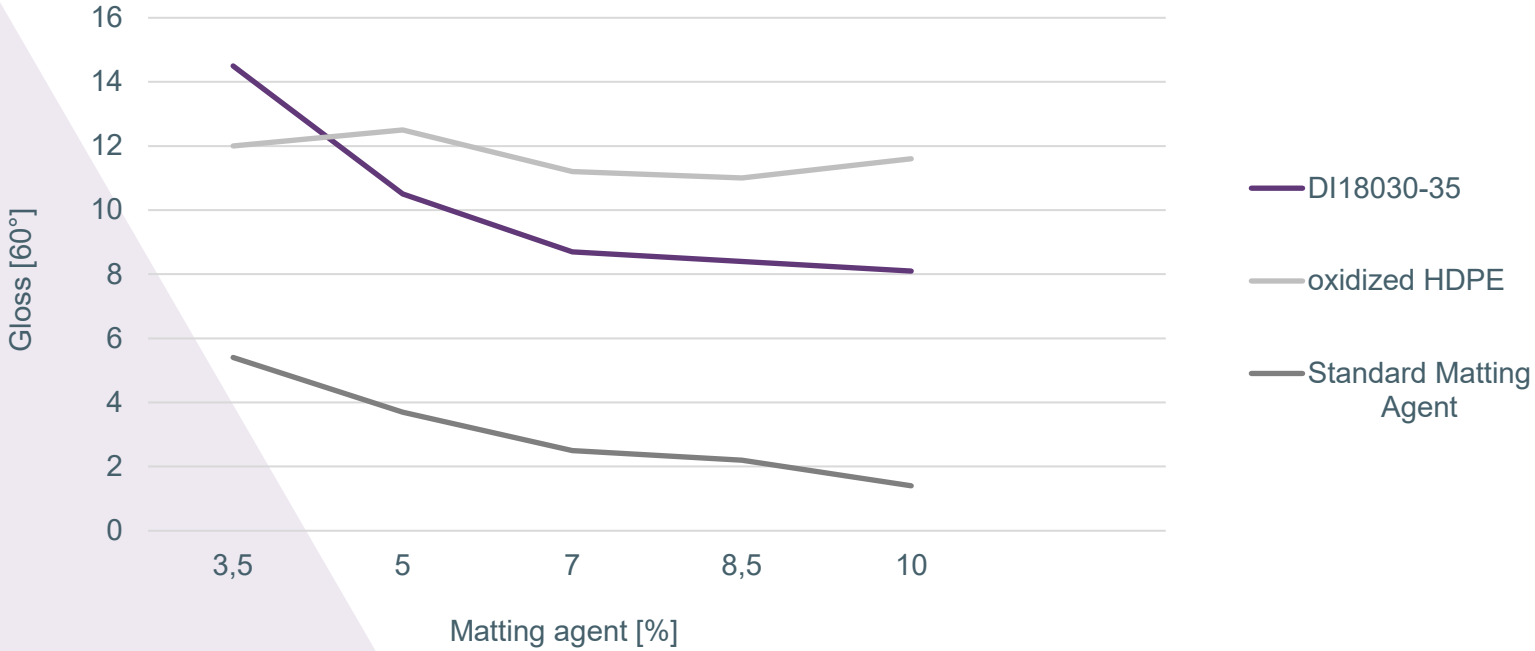
Effects

- No need for dusty, powdered matting agents
- Easy to formulate with low foaming
- Shorter production time/less use of energy
- Low VOC demand
- Stable – no settling of the polymer

Wood

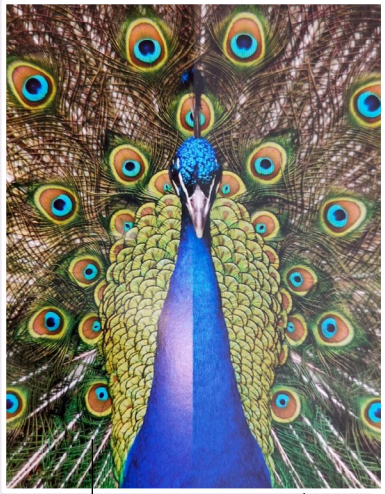
OPV

Comparison of gloss reduction

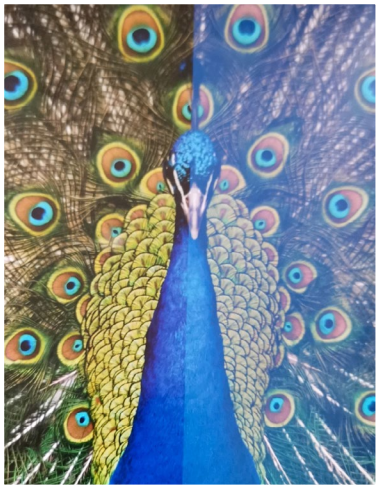


Low haze

- OPV applied over red printing ink



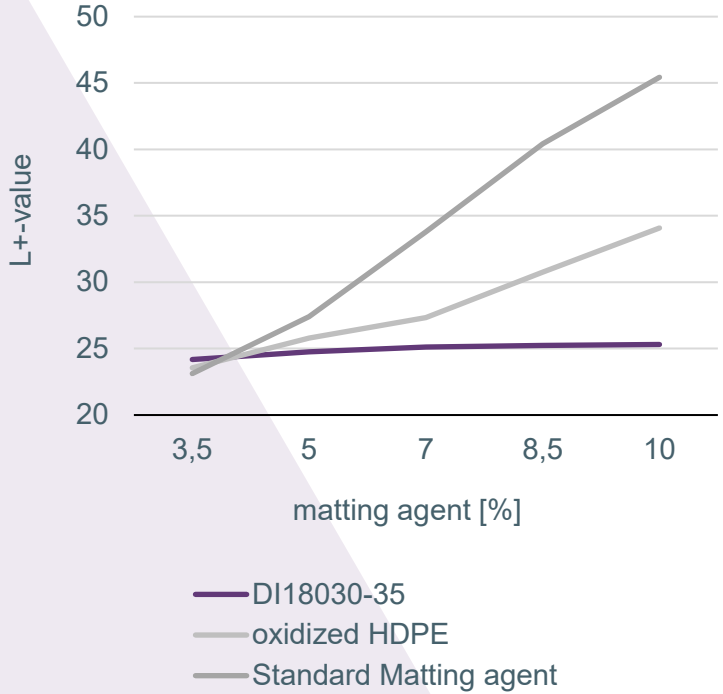
Non-coated Substrate | Matte OPV with DI18030-35



Non-coated Substrate | Matte OPV with standard matting agent

- On wood: excellent transparency outlining colour and structure of the surface
  - "natural look" on wood

Colour strengths black printing ink



Oxidised HDPE

DI18030-35

Standard matting agent

DI18030-35

Other polymer technologies

- Self-crosslinking technology
- Multiphase technology
- Wax-hybrid technology
- Alkali-soluble technology (resin solution)

BRINGING YOUR IDEAS TO THE SURFACE

Thank you for your attention.

- zschimmer-schwarz.com/paints-coatings
- F.Gyger@zschimmer-schwarz.com