

We will start soon...

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Your **hosts** for this call

Formulation Additives
to improve surface slip
and leveling



Maurice Epple
Presenter



Andrea Schamp/
Kerstin Schurig
Chat

Formulation Additives to improve surface slip and leveling

Maurice Epple

Ludwigshafen, 03.02.2021



Maurice Epple

**Technical Sales
Formulation Additives
EMEA**

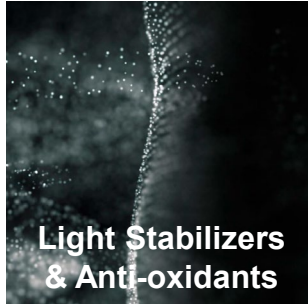
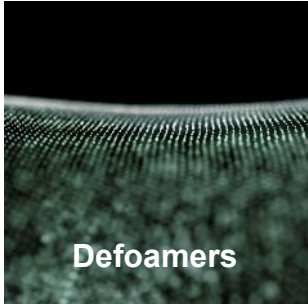
1. Introduction

2. Theory: Why surface modifiers?

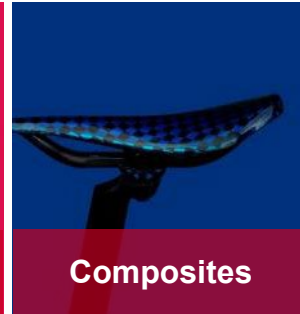
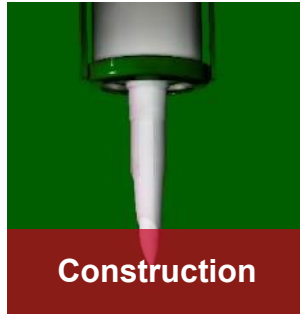
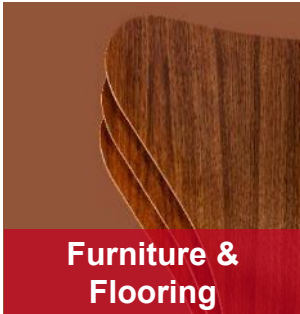
3. Application examples & products highlights

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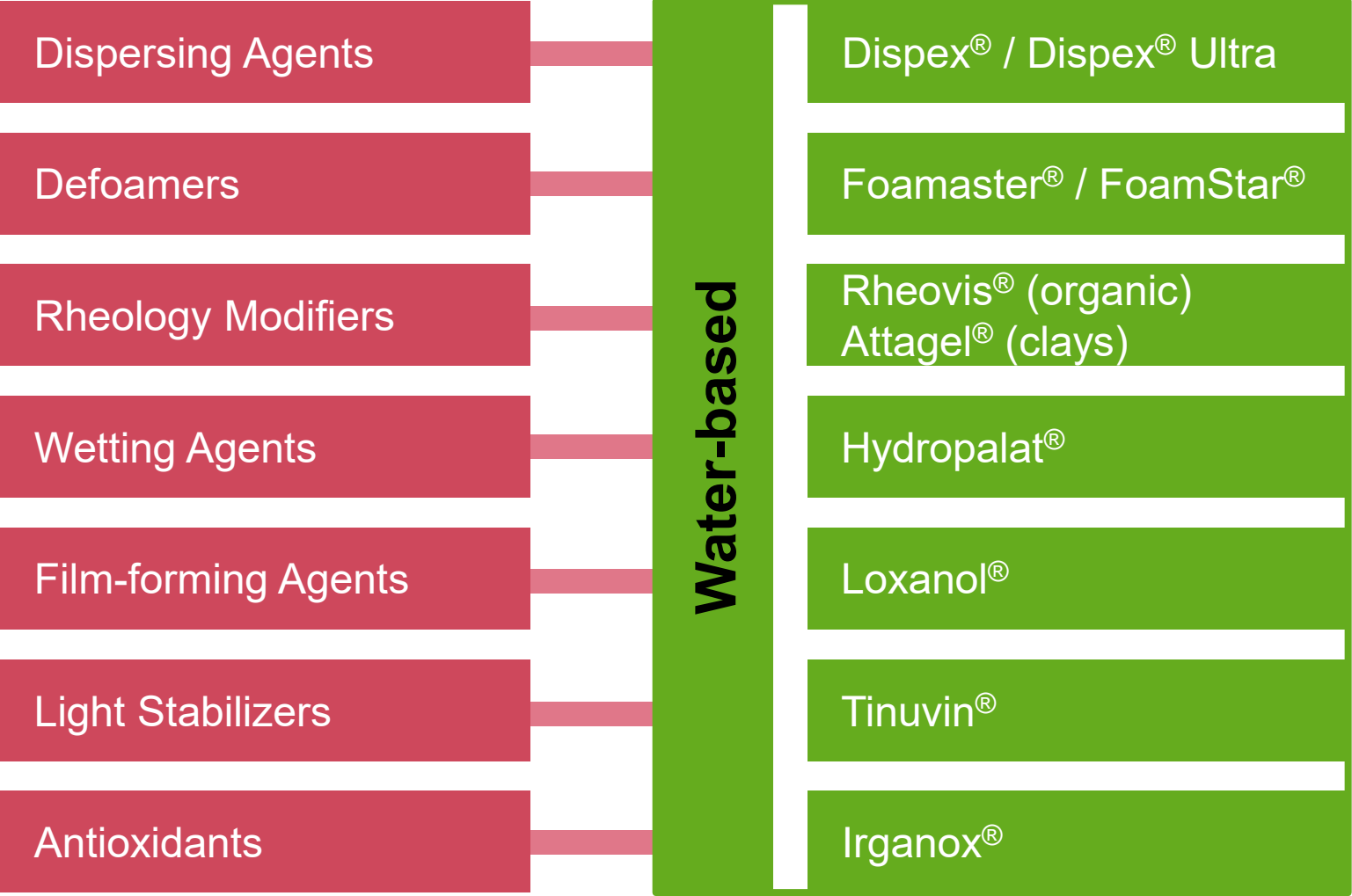
Our comprehensive portfolio enables solutions for various industries



BASF is the premiere provider of **Performance & Formulation Additives** for the paints and coatings industry



Strong brands to empower your business

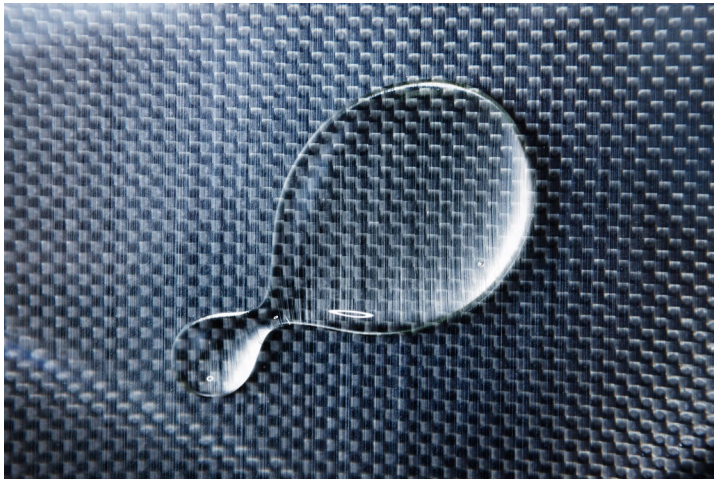


*includes also high solids and 100% systems

Wetting agents and surface modifiers

Surface tension related effects

- ✓ Increased substrate wetting
- ✓ Improved adhesion
- ✓ Eliminate cratering



Flow related effects

- ✓ Eliminate orange-peel
- ✓ Eliminate brush marks or cissing
- ✓ Smooth surface and look



Slip effects

- ✓ Improved anti blocking
- ✓ Improved mar resistance
- ✓ Anti dirt pick-up



Wetting agents and surface modifiers

Product lines

Wetting Agents and Surface Modifiers

Effect	Water-based	Non-aqueous
Wetting agent	Hydropalat® WE 3xxx	Efka® WE 3xxx
Flow & leveling	Hydropalat® FL 3xxx	Efka® FL 3xxx
Slip & mar agent	Hydropalat® SL 3xxx	Efka® SL 3xxx



1. Introduction

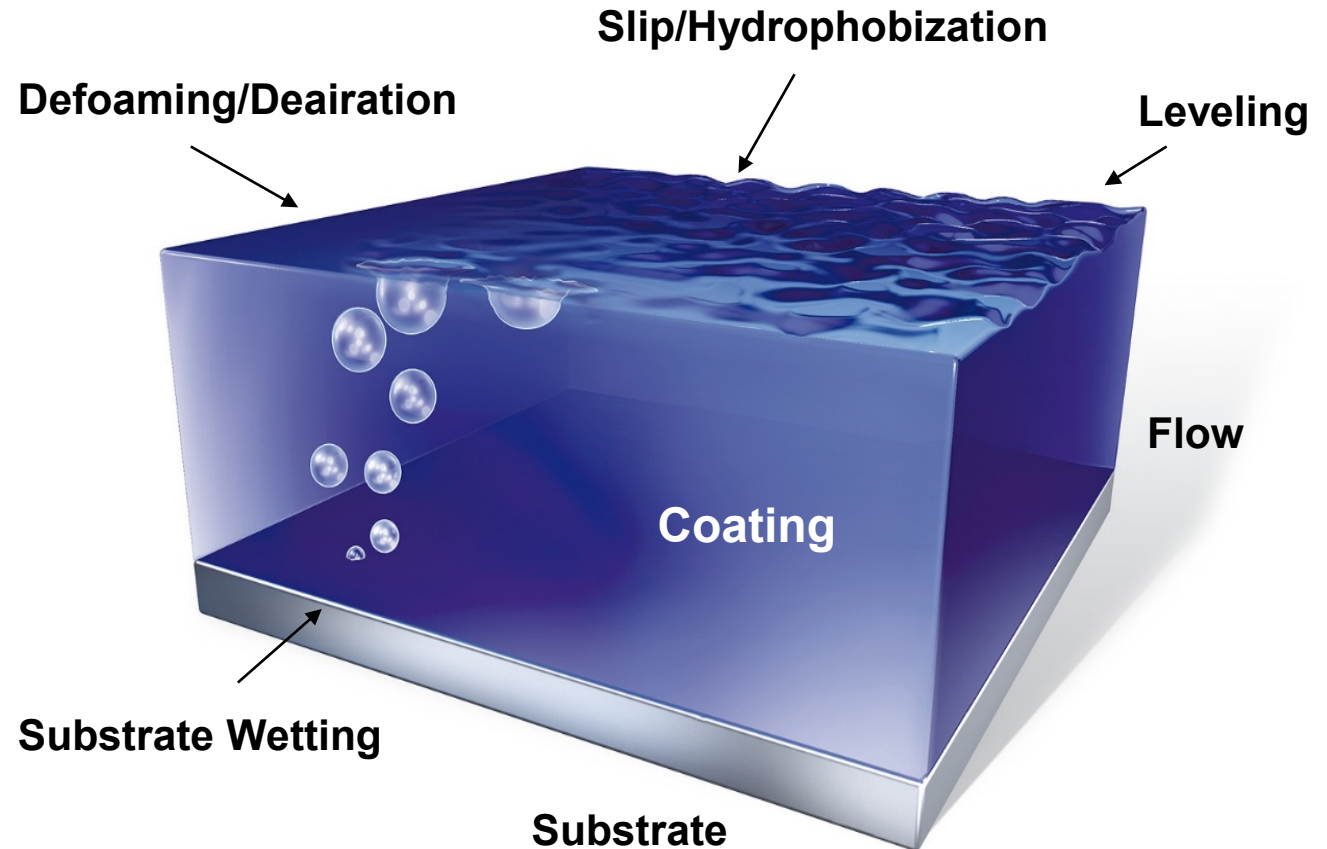
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Wetting agents and surface modifiers can influence several coating properties

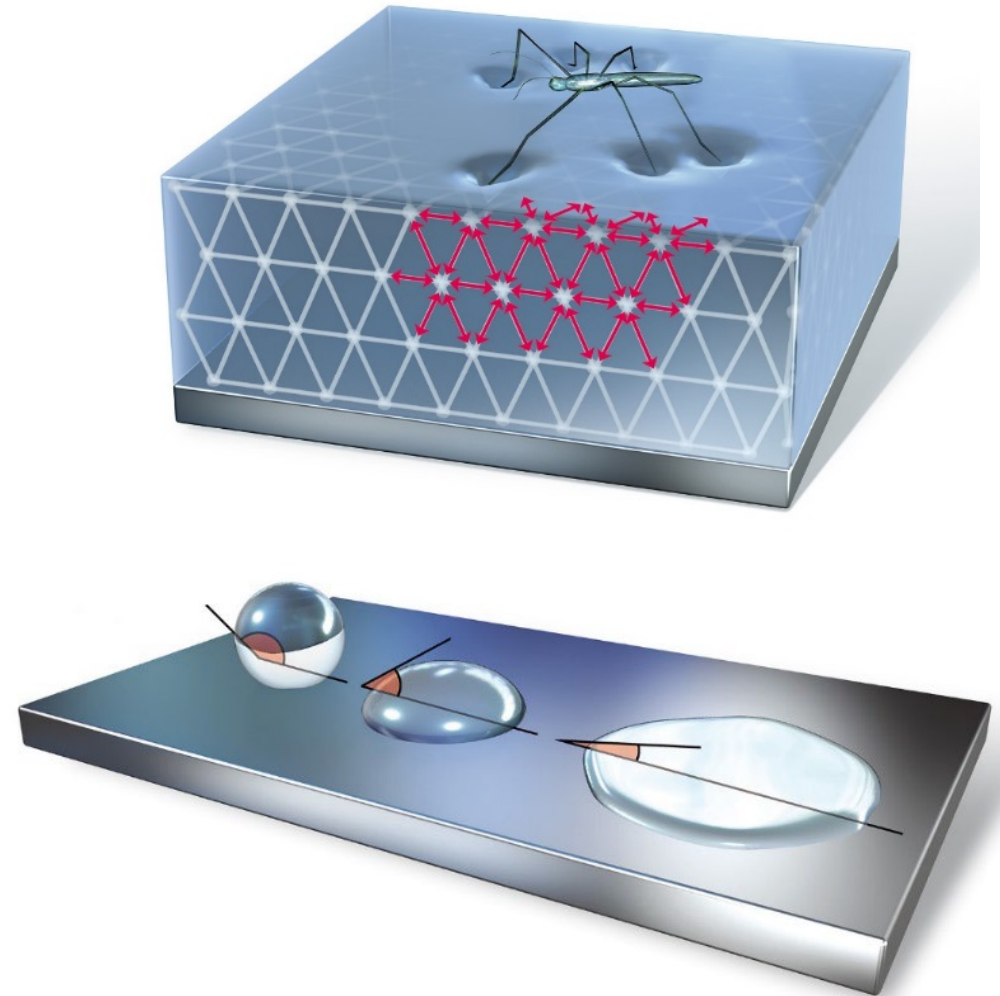
- (Substrate) Wetting
- Flow & Leveling
- Gloss
- Foam / Deaeration
- Slip / Antiblocking
- (Intercoat) Adhesion



Surface tension and substrate wetting

In order to control the surface we have to control the surface tension of the coatings:

- Pure water has a relatively high surface tension (72.2 mN/m)
- Low energy plastic substrates are difficult to wet by aqueous coatings (eg. PVC: 40 mN/m, PP: 28 mN/m)
- Need for specialized wetting agents to lower surface tension to allow complete wetting

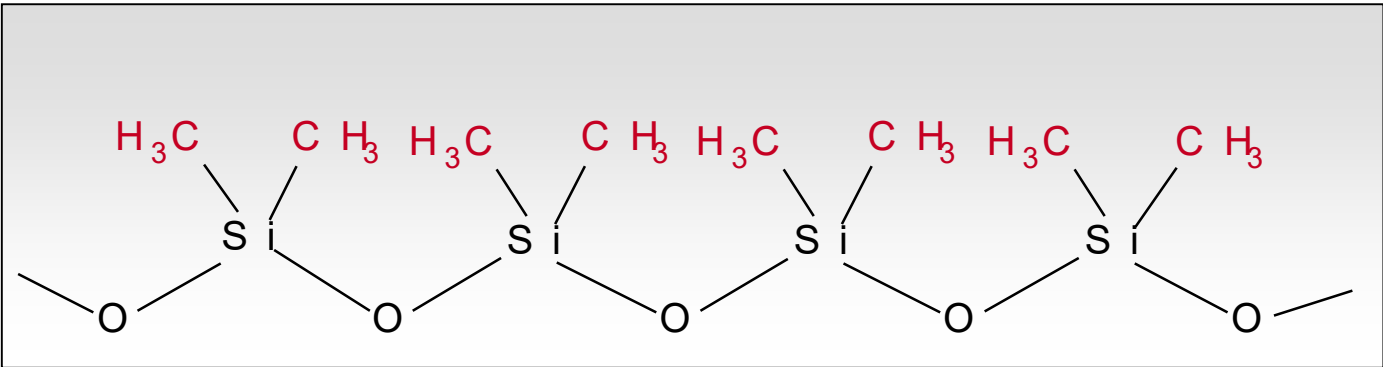


Example for substrate wetting

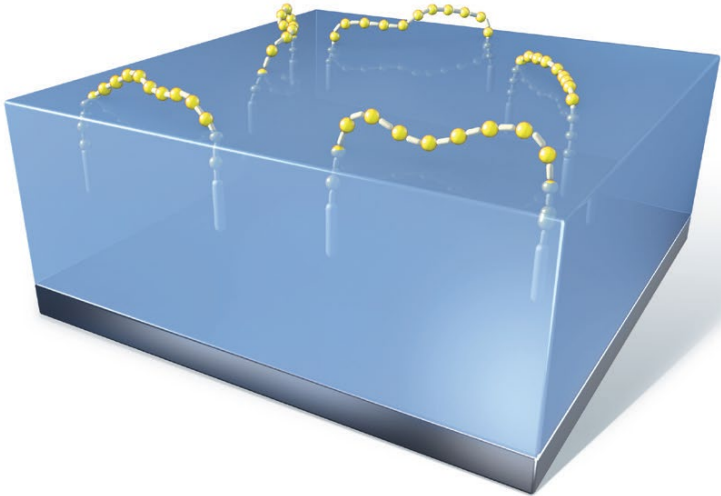


Slip, lubricity, surface smoothness

Slip is generated by polysiloxanes with $[Me_2SiO]$ groups and certain classes of waxes (amide, polyethylene, paraffin), due to the low intermolecular forces between the molecules

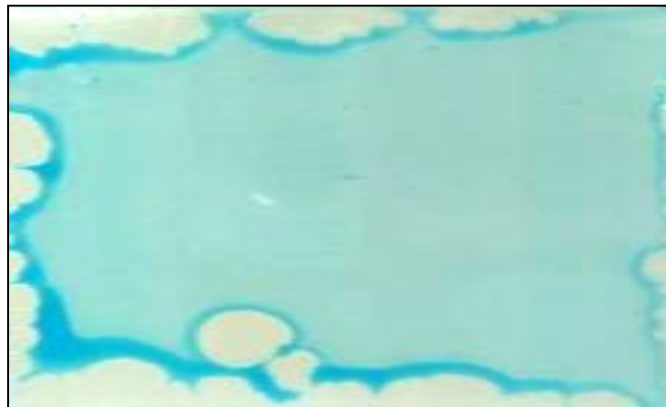


Orientation of PDMS at coating surface



Need for wetting agents and surface modifiers: Crawling & de-wetting

- occurs during or shortly after application
- tendency of a wet paint film to recede from certain areas of the substrate leaving them apparently uncoated
- caused by an incompatible film on the surface or a substrate with too low surface tension (e.g. plastic)
- more pronounced in aqueous systems (higher intrinsic surface tension water + polar components) than solvent-based systems

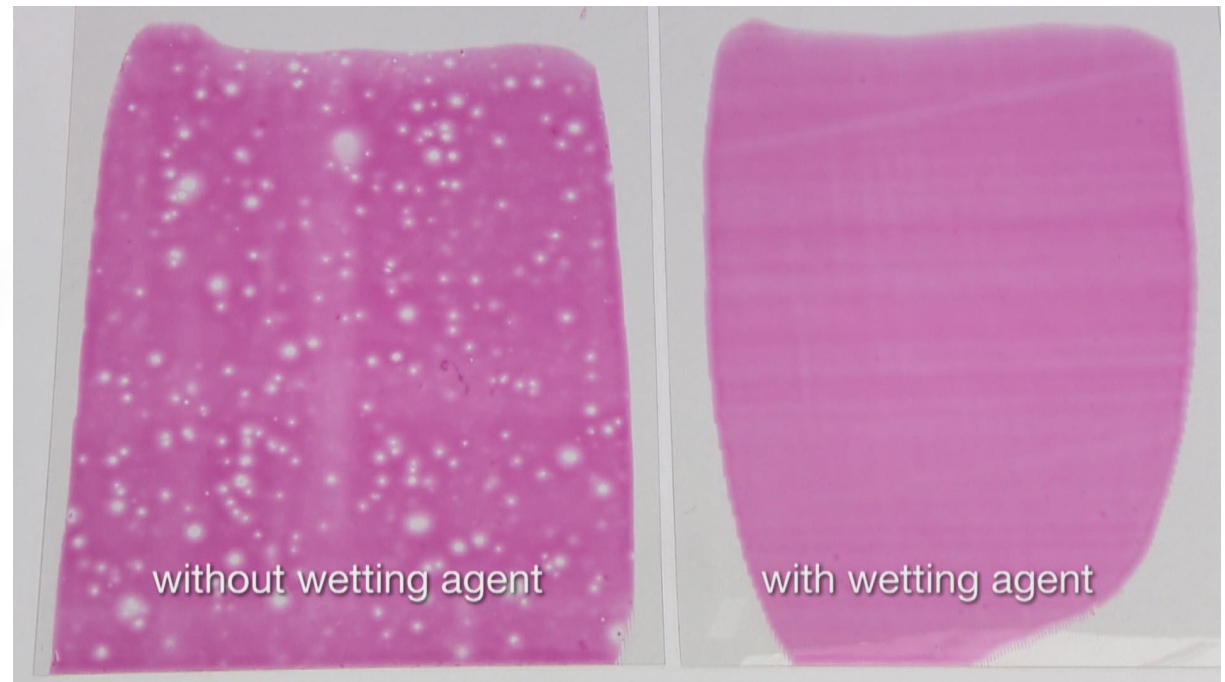
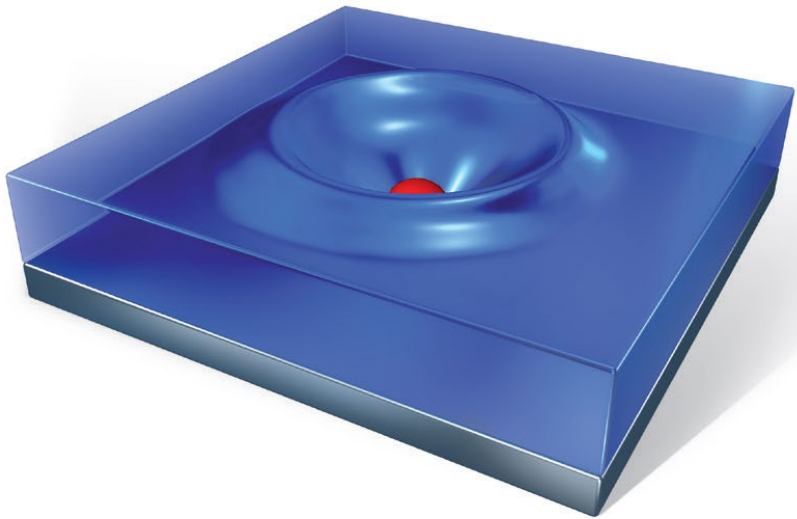


Aqueous coating on
low energy surface

Need for wetting agents and surface modifiers:

Cratering

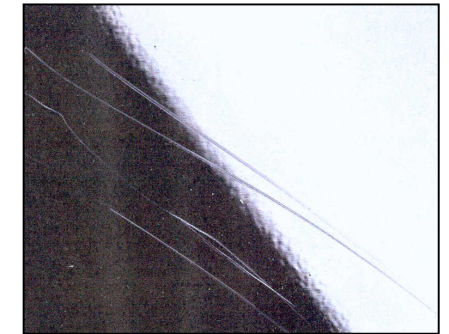
- Craters are depressions where the paint on the surface has receded, often concentrically, to leave a spot with no paint.
- Cratering is caused by incompatible foreign materials either in the paint or on the substrate resulting in losing wetting condition, $\gamma_L < \gamma_S$.



Need for wetting agents and surface modifiers: Mar & blocking resistance

Slip additives provide or improve mar and blocking resistance

Mar resistance: ability of a coating to resist damage caused by light abrasion, impact or pressure (e.g. scratches, metal marking).



Blocking resistance (or anti-blocking): undesired adhesion between touching layers of a material, such as occurs under moderate pressure and sometimes pressure and heat, during storage or fabrication; suppression of dirt adhesion.



1. Introduction

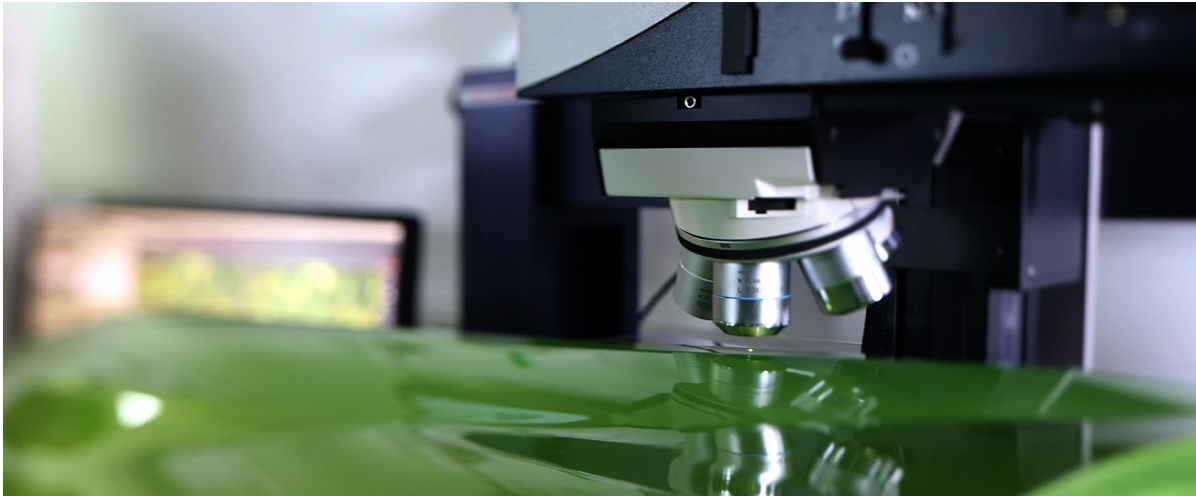
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Hydropalat® WE 3220 / 3221

Silicone surfactants for water-based coatings with excellent substrate wetting



Application:

Hydropalat® WE 3220 / WE 3221 show strong reduction of surface tension in water-based systems and are highly suited to improve substrate wetting and to prevent surface defects. They are recommended as anti-crater additives with good recoatability. Based on short organically modified polysiloxanes, Hydropalat® WE 3220 / WE 3221 do not increase surface slip.

Sustainability highlights:

- Food Contact Compliances: Swiss Ordinance SR 817.023.21

Performance highlights:

- Silicone surfactants based on organo modified silicones
- Excellent substrate wetting
- Strong reduction of surface tension
- No increase of surface slip
- Anti-cratering
- Good surface leveling

Characteristic Values:

Appearance	Clear colorless, low-viscosity liquid
Density at 20°C	~ 1,04 g/cm ³ / ~ 1,00 g/cm ³
Active matter	~ 100% / ~ 52%
Color (Gardner)	max. 2

Hydropalat® WE 3225

Silicone based wetting agent with pronounced defoaming action



Application:

Hydropalat® WE 3225 is a silicone based wetting agent with pronounced defoaming action for all kinds of aqueous spray coating formulations. It combines excellent compatibility and wetting action with defoaming properties.

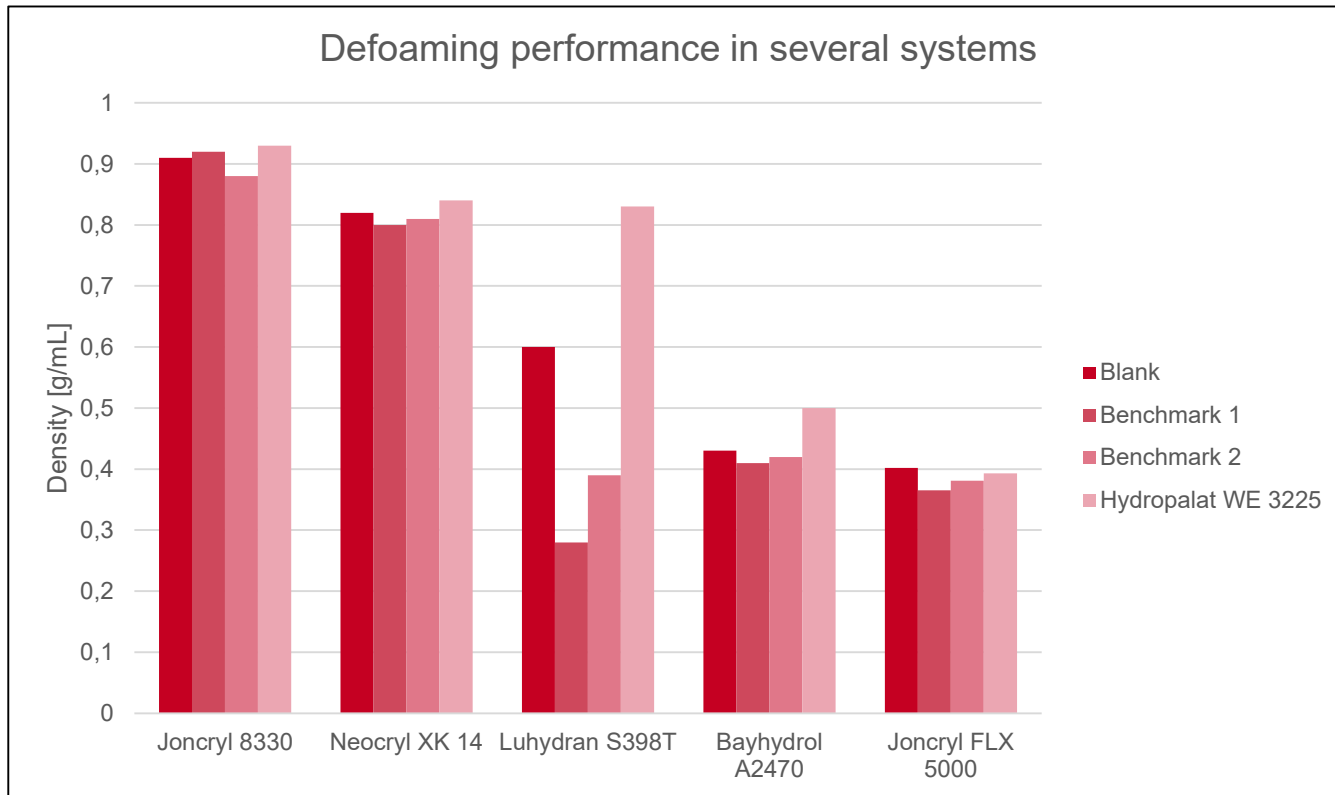
Performance highlights:

- Excellent substrate wetting
- Eliminates surface defects caused by craters or air bubbles
- Pronounced defoaming characteristics
- Excellent wood grain accentuation
- Low VOC and odor

Characteristic Values:

Density at 20°C	~ 1.02 g/cm ³
Viscosity	~ 150 mPa·s

Defoaming performance



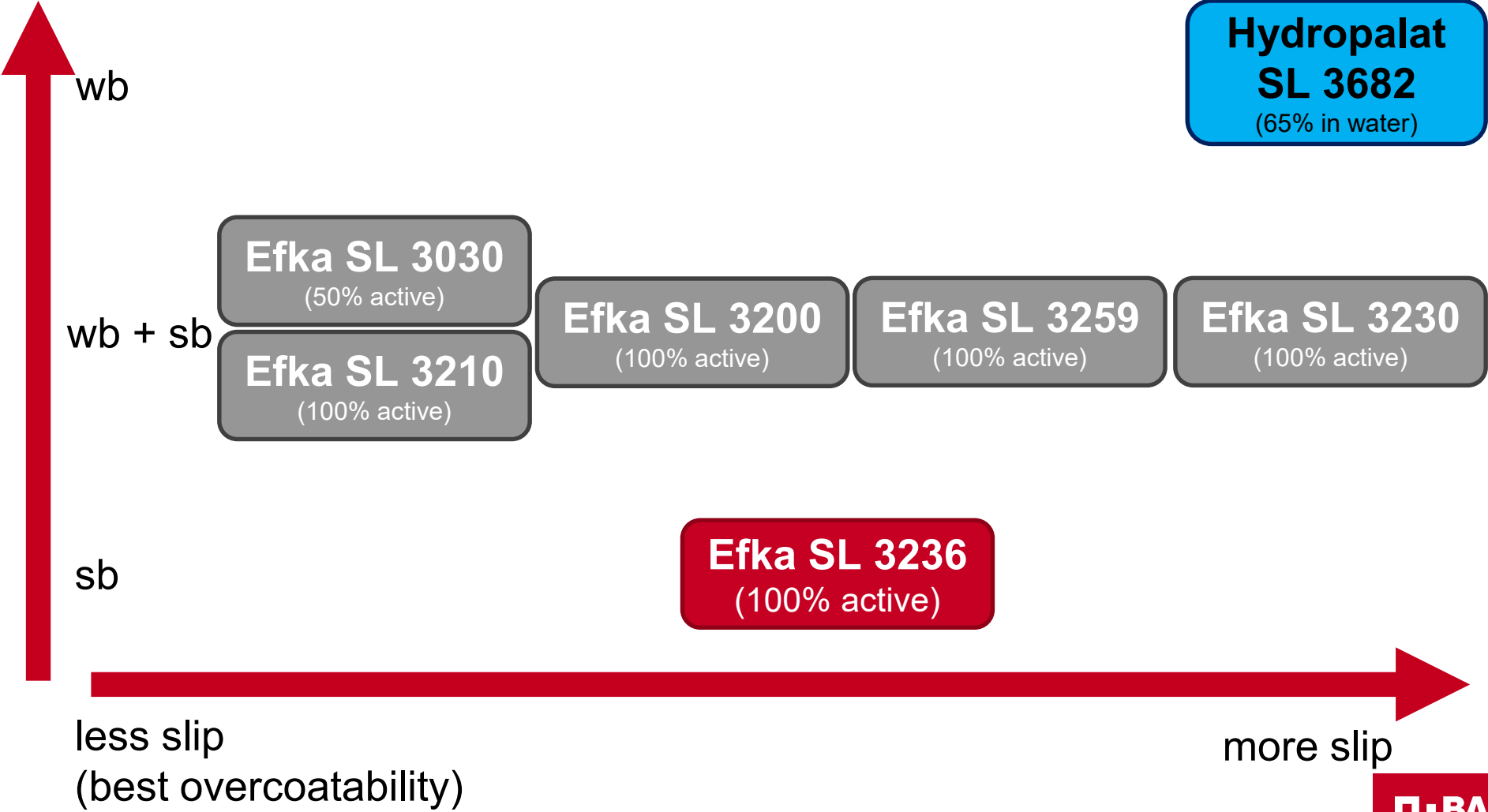
Procedure: Formulation is stirred with a dissolver (e.g. 3 min at 4000 rpm). Density of the resulting foamy mixture is being measured. The higher the density the less foam is in the formulation.



Source: BASF Formulation Additives Defoamer Video

Hydropalat® WE 3225 shows excellent defoaming performance compared to benchmark 1 and 2.

Overview Slip Additives



Hydropalat® SL 3682

Highly effective slip and anti-blocking agent for water-based paint, coatings and ink systems



Application:

Hydropalat® SL 3682 is an aqueous emulsion of an ultra-high molecular weight silicone providing excellent slip, scratch and mar resistance and anti-blocking properties. Additionally, Hydropalat® SL 3682 is recommended for Furniture and Flooring Coatings, Architectural Coatings and the Printing and Packaging Industry.

Sustainability highlights:

- More sustainable vs existing market standards
 - Tin-free
 - Free of Ethylbenzene

Performance highlights:

- Excellent slip and mar resistance
- Excellent anti-blocking properties
- Broad compatibility with different binder systems
- Suitable for both glossy and matt pigmented systems as well as for clear coats (wood coatings)

Characteristic Values:

Appearance	Clear to slightly hazy, slightly yellowish liquid
Density at 20°C	~ 0.98 g/cm ³
Solid content	~ 65%
Viscosity	~ 3000 mPa·s

Efka® SL 3230

Cost-effective, universal, high performance slip & leveling agent



Application:

Efka® SL 3230 is a universal, cost-effective, high performance slip and leveling agent for all types of water-based, solvent-based and solvent-free applications. Efka® SL 3230 achieves an excellent reduction of surface tension in UV-systems, which leads to an improved gloss level. Due to its excellent compatibility, Efka® SL 3230 is suitable for clear coatings.

Sustainability highlights:

- No hazard warning label
- Low VOC

Performance highlights:

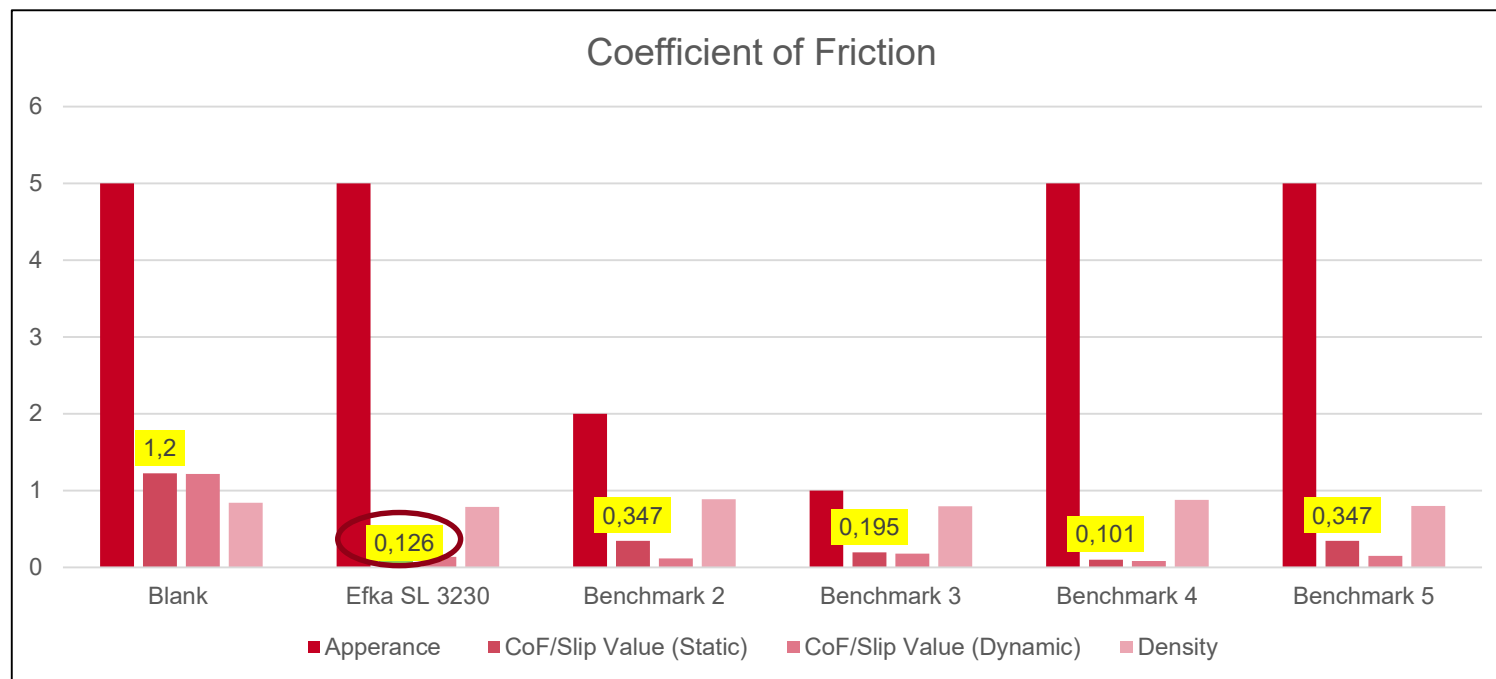
- Suitable for high gloss systems and clear coats
- Pronounced surface activity and crater prevention
- Increased slip
- Improved leveling and surface smoothness
- Improved scratch and abrasion resistance
- Excellent price performance ratio

Characteristic Values:

Appearance	Clear colorless liquid
Density at 20°C	~ 1.05 g/cm ³
Solid content	~ 98%
Viscosity	~ 1300 mPa·s

Efka[®] SL 3230

Very efficient slip agent vs internal benchmarks



Varnish 2	
Laromer LR 8986	55
Laromer PO 94 F	35
Laromer PR 8863	3
Irgacure 127	7
Slip Agent	1

Efka[®] SL 3230 shows improved slip in comparison to benchmarks.

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Summary

- BASF offers a comprehensive portfolio of surface modifiers
- Various chemistries
- For all industries
- Highly compatible slip agents
- Excellent leveling agents
- Strong wetting agents



Solution Finder Tool for Formulation Additives



The **Solution Finder Tool** offers you the best additive solution for your formulation needs across all industries (www.basf.com/solution-finder)

Features & Benefits

- Formulation Additives guide for Paints and Coatings, Adhesives and Construction*
- Understand the benefits of our products (Dispersing Agents, Defoamers, Rheology Modifiers, Wetting Agents and Surface Modifiers, and Film-Forming Agents) by application, and with technical information
- Order samples or email us for detailed consultations
- Available on BASF web, Apple Store and Google Play Store**

*The product list and sample ordering for adhesives and construction are only applicable in Europe. It also comprises recommendations for Performance Additives

**To use this tool on your Windows device, please visit our website for details

Scan QR
code for
details



Lab Assistant for Architectural Coatings



Lab Assistant is a web-based application that makes it easier for you to find BASF dispersions and additives for Architectural Coatings in Europe (www.lab-assistant.basf.com)

Features & Benefits

- Get product recommendations and formulation ideas according to the final properties of the paint, technical data, complete recipes and ingredient calculator
- Access formulation expertise to gain new insights and ideas
- All relevant data (e.g. MSDS, TDS, Reach, sustainability aspects, brochures, value cards, etc) available in one location
- Compare products or formulations
- Individualize your own account and share content with your colleagues
- Order samples or get in touch with our experts
- Runs on your PC / laptop / tablet / smartphone



Scan QR code for details



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There is more to come...

Next series of Webinars starting Jan 20th

Performance Additives for Industrial Wood Coatings: **Jan 20 & 21**

Formulation Additives for Wood Coatings: **Jan 27 & 28**

Formulation Additives to improve surface slip and levelling: **Feb 3 & 4**

Dispersing agents for water-based DTM Coatings : Feb 10 & 11

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We create chemistry

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