Have you transformed your formulation yet?

Boosting Opacity

Enhancement of Paints & Coatings with ChameleoBoost™ Technology

THINKING OF TOMORROW


enhanced
by Omya

Boosting Opacity with ChameleoBoost™ inspired by Omya

In general terms, opacity can be described as the ability of a substance or mixture to hide a substrate. A typical example would be a coating film covering a given surface such as a wall. This simple phenomenon is actually the result of a rather complex interplay of various components and parameters. In industry, opacity is often referred to using other terms such as contrast ratio or hiding power. Whatever term is used, the common functionality they describe is the ability of an applied optical layer to hide what is underneath.

Have you transformed your formulation yet?

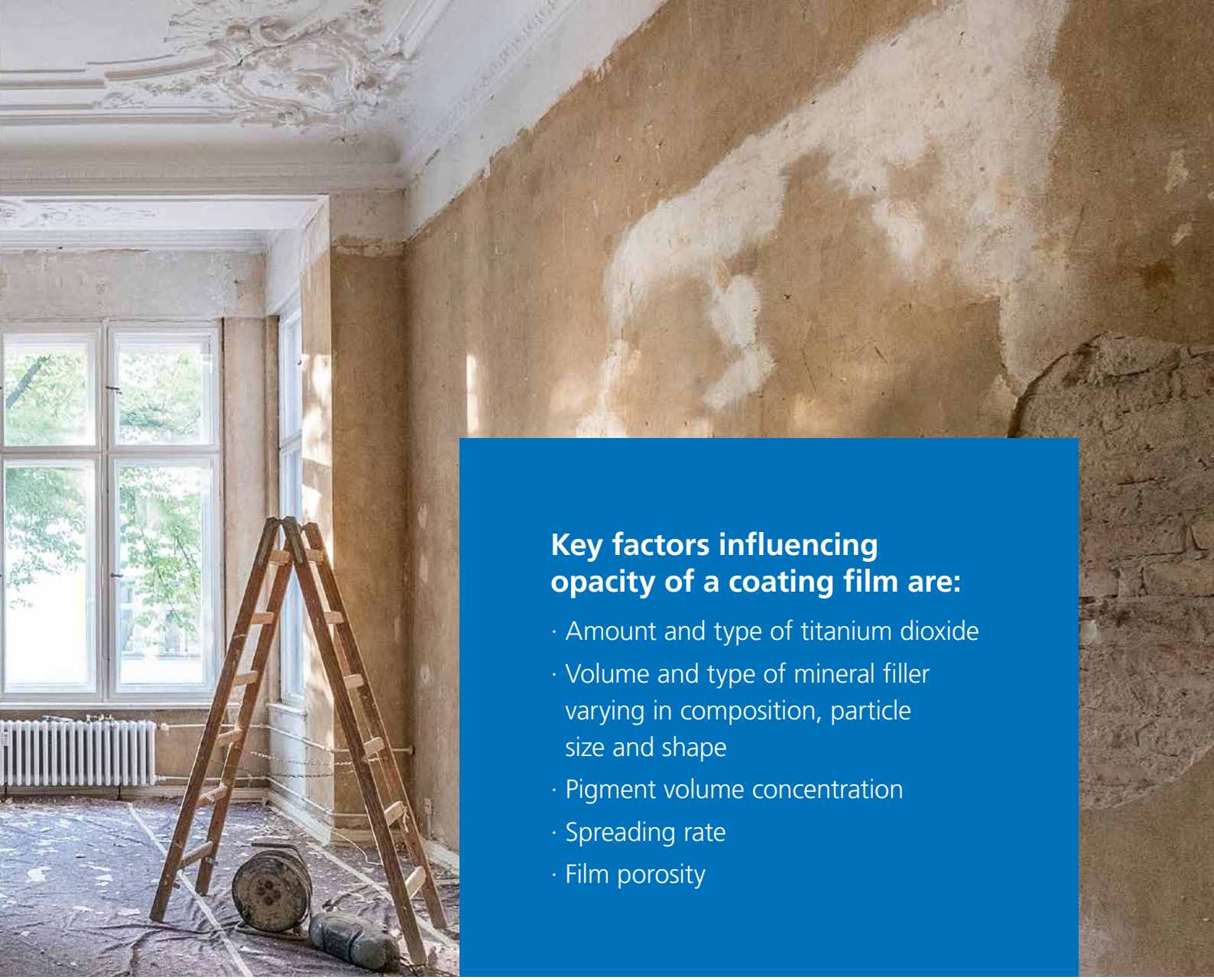
ChameleoBoost™ Technology

Simply put, opacity of a coating is high if the difference between refractive index of the coating constituents is large. In practice, this can be easily achieved by adding white pigment such as titanium dioxide to a coating formulation. The required amount of white pigment for high opacity (sometimes referred to as coverage or hiding efficiency) depends on the binder content, or more precisely on the so-called pigment volume concentration (PVC). Problem solved!

However, if we combine economic considerations with technical knowhow, the way of formulating coating materials might change significantly. In fact, the addition of mineral fillers such as calcium carbonate products can reduce formulation cost sharply, but typically have a negative impact on optical performance such as opacity.

ChameleoBoost™ by Omya offers a unique solution for boosting opacity while optimizing formulation cost. **ChameleoBoost™** will either enhance coating performance (e.g. opacity) at equal formulation cost or reduce formulation cost (e.g. partial substitution of titanium dioxide) while maintaining performance level of the coating film. Any combination of the two is of course possible as well.

Each of these factors have a direct impact on light absorption and scattering. PVC level and film porosity are particularly important when it comes to film opacity. On one hand, coatings formulated at low PVC typically exhibit high durability providing good weather and wet scrub resistance, but high pigment levels are required to achieve acceptable opacity performance. On the other



Key factors influencing opacity of a coating film are:

- Amount and type of titanium dioxide
- Volume and type of mineral filler varying in composition, particle size and shape
- Pigment volume concentration
- Spreading rate
- Film porosity

hand, formulations with high PVC are usually less durable, but require less pigment to reach good coverage due to increased film porosity. In fact, entrapped air in the pores of the coating film has a different optical density (or refractive index) compared to mineral fillers, pigments and binder, and thus increases the difference between refractive indices. Furthermore, ultrafine mineral particles support the even distribution and stabilization of single pigment particles and provide an additional boost of opacity. The latter phenomenon is called pigment spacing which leads to more efficient light scattering by increasing particle interface surface area compared to a situation where pigment particles are agglomerated. **ChameleoBoost™** by Omya allows for the optimal adjustment of coating opacity while keeping formulation cost to a minimum through the use of qualified functional mineral offering consists of:

Powder products:

Omyabrite
Omyawhite
Omyacarb Extra
Calcigloss
Omyacoat

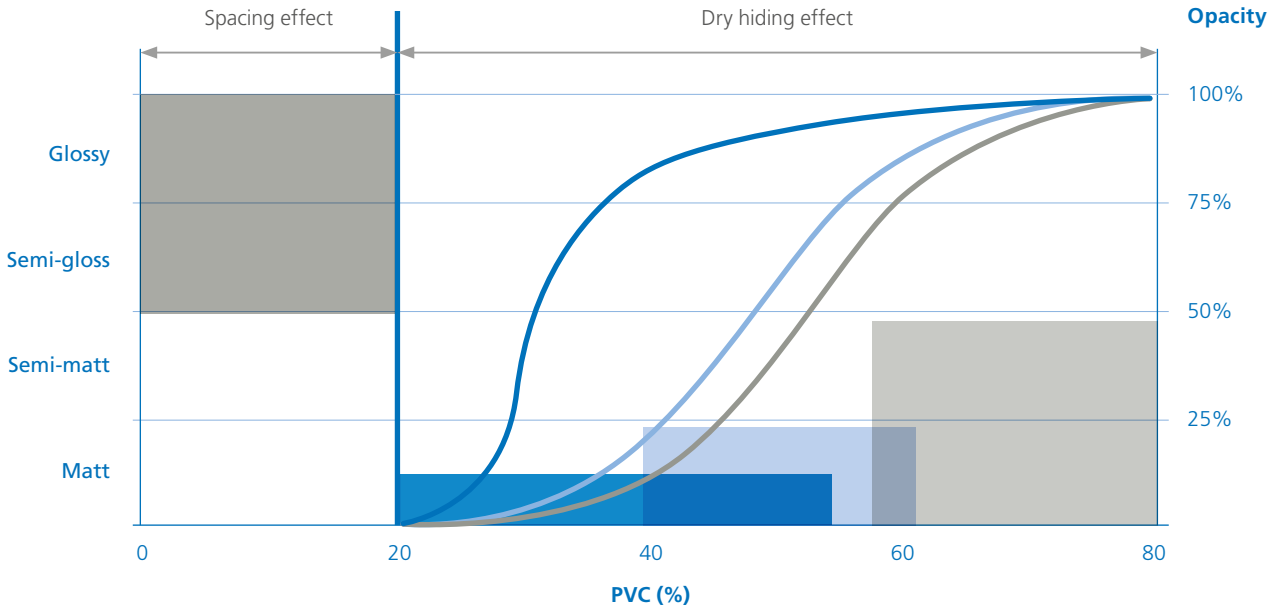
Slurry products:

Omyaflow

ChameleoBoost™ inspired by Omya

ChameleoBoost™ inspired by Omya offers functional mineral fillers combined with formulation expertise for a large application field covering the entire PVC range of decorative paints for matt over semi-matt and semi-gloss to glossy paint systems.

ChameleoBoost™



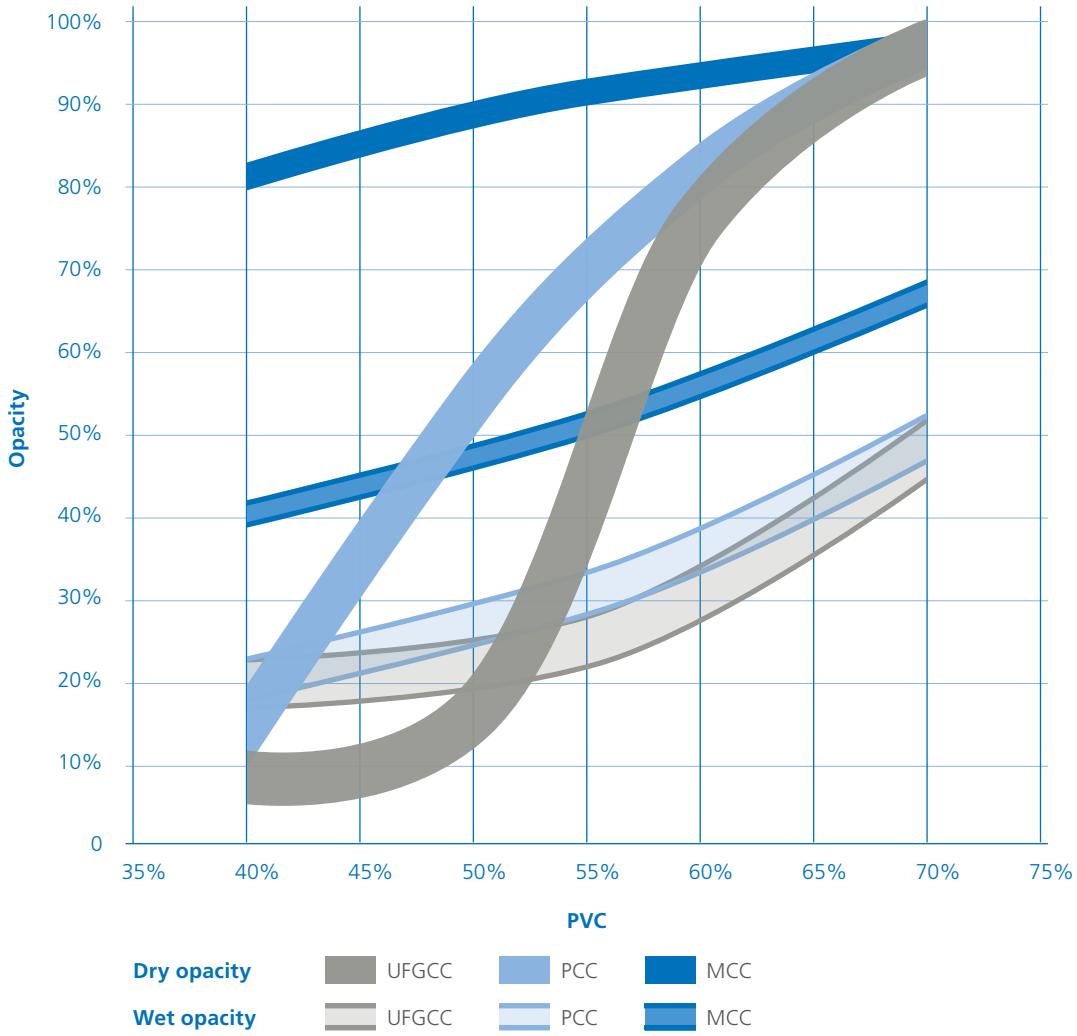
Application recommendation

- Omyacarb Extra, Calcigloss, Omyaflow
- Omyabrite
- Omyawhite
- Omyacarb Extra, Omyacoat, Omyaflow

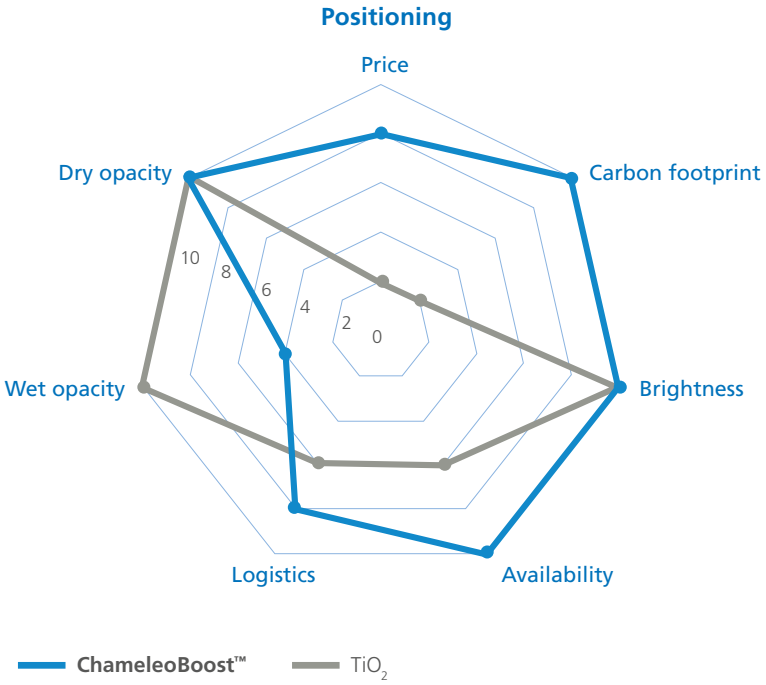
Development of opacity without white pigments

- MCC
- PCC
- UFGCC

Development of dry and wet opacity of different $CaCO_3$ without white pigments

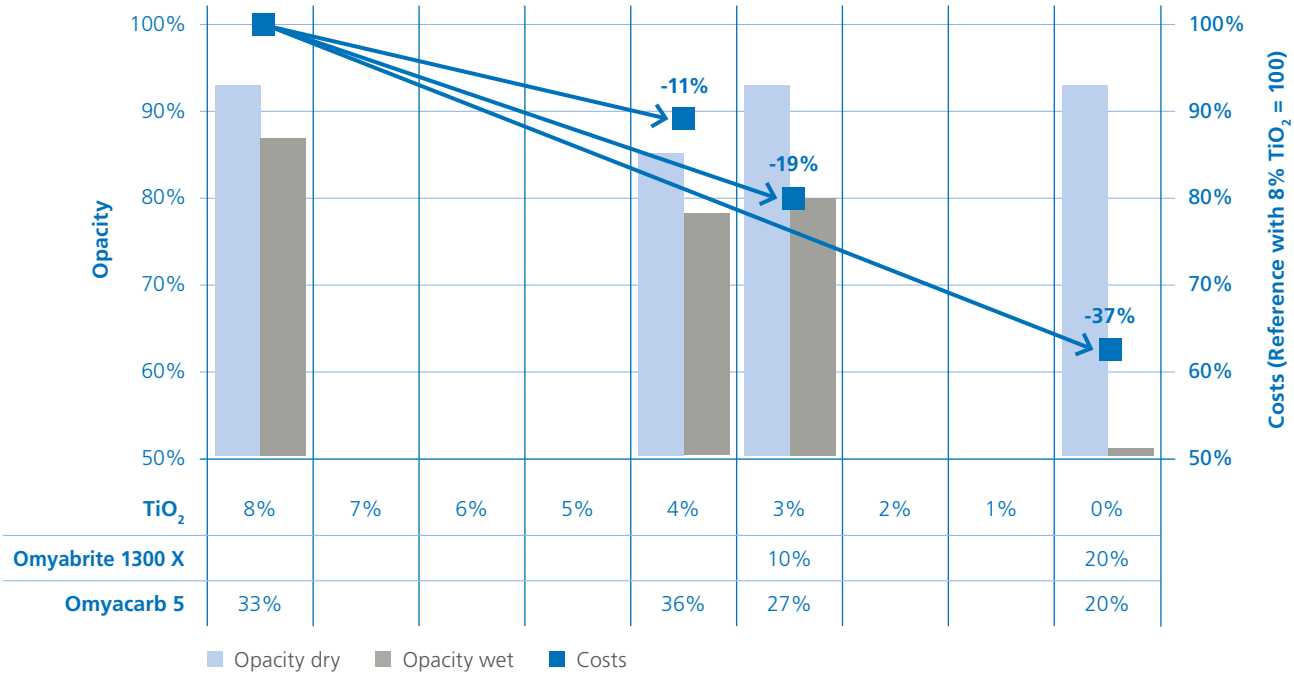


ChameleoBoost™ versus TiO_2



In many cases, **ChameleoBoost™** is used in combination with high quality GCC fillers such as Omyacarb to balance additional coating properties such as wet scrub resistance, solids, rheology and workability through optimized particle packing.

Cost impact onto dry and wet opacity in emulsion paint at PVC 65% at different TiO_2 levels



The use of Omya ChameleoBoost™ offers a series of benefits:

- Opacity boosting
- High brightness
- Enhanced TiO_2 performance through spacing effect & dry hiding
- Formulation cost optimization (e.g. partial substitution of TiO_2)
- Gloss control
- Reduced carbon footprint of coating formulation

ChameleoBoost™ Technology

Carbon Footprint reduction through partial substitution of TiO_2 with UFGCC

Components		Formulations					CO_2 per ton of formulated product [kg/t]				
	CO_2 [kg/t]	Con-trol	-10% TiO_2	-20% TiO_2	-30% TiO_2	-40% TiO_2	Con-trol	-10% TiO_2	-20% TiO_2	-30% TiO_2	-40% TiO_2
Water + Additives	10	30.0	30.0	30.0	30.0	30.0	3.0	3.0	3.0	3.0	3.0
Fillers	200	38.0	38.0	38.0	38.0	38.0	76.0	76.0	76.0	76.0	76.0
TiO_2	5300	15.0	13.5	12.0	10.5	9.0	795.0	715.5	636.0	556.5	477.0
Ultrafine GCC	54.2	0.0	1.5	3.0	4.5	6.0	0.0	0.8	1.6	2.4	3.3
Emulsion	2500	17.0	17.0	17.0	17.0	17.0	425.0	425.0	425.0	425.0	425.0
Total		100	100	100	100	100	1299	1220	1142	1063	984
							CO_2 reduction [%]:	**6%**	**12%**	**18%**	**24%**

Significantly lower the carbon footprint of your paint formulation with Ultrafine GCC's.

Product Matrix

The **ChameleoBoost™** Technology offers a wide product portfolio for water- and solvent-based as well as powder coatings. No matter where you demand boosting opacity, Omya supplies with smart logistics all over the world. Production is located in our regions Americas (RAM), Asia-Pacific (RAP), Europe (REU) and Greater South & East (RSE).

Solvent based

Product	Produced in	Market (Region)	Technology	Delivery Form	Decorative	Industrial
Omyacarb Extra	Various	REU, RSE, RAM	UFGCC	Powder	++	++
Calcigloss	Various	RAP	UFGCC	Powder	++	++
Hakuenka CCR-S	Austria	REU	PCC	Powder	+	+

Water based

Product	Produced in	Market (Region)	Technology	Delivery Form	Decorative			
					Gloss	Semi-Gloss	Semi-Matt	Matt
Omyacarb Extra	Various	RAM	UFGCC	Powder	++	++	++	++
Calcigloss	Various	RAP	UFGCC	Powder	++	++	++	+
Omyacoat Series	Various	Global	UFGCC	Powder	-	+	++	++
Omyaflow Series (Ultrafine)	Various	Global	UFGCC	Slurry	+	++	++	+
Omyawhite Series	Austria	Global	PCC	Powder	-	-	++	++
Omyawhite 20	Austria	Global	PCC	Powder	-	-	++	++
Omyawhite Plus	Austria	Global	PCC	Powder	-	-	++	++
Hakuenka CCR-S	Austria	REU	PCC	Powder	++	++	-	-
Omyabrite 1300 X	France	Global	MCC	Powder	-	-	+	++

MINERAL EXCELLENCE SINCE 1884

Omya International AG, Baslerstrasse 42, CH-4665 Oftringen, email: construction@omya.com

THIS PAPER CONTAINS OMYA PIGMENTS

Source: Omya International (2022/07) EN