



DuPont™ Liveo™ toolbox of innovative silicone resin blends and film-forming formulations for topical indications

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Purpose

DuPont offers multiple silicone technologies to better meet the needs of topical formulations. This study focuses on key film attributes associated with the DuPont™ Liveo™ Resin Blend technology portfolio. This study opens various prospective future uses of silicone excipients as film-formers that would enable formulating topical dosage forms combined with specific film properties, such as long-lasting substantivity and wash-off resistance.

Material & methodology

Liveo™ Silicone Resin Blends

Description

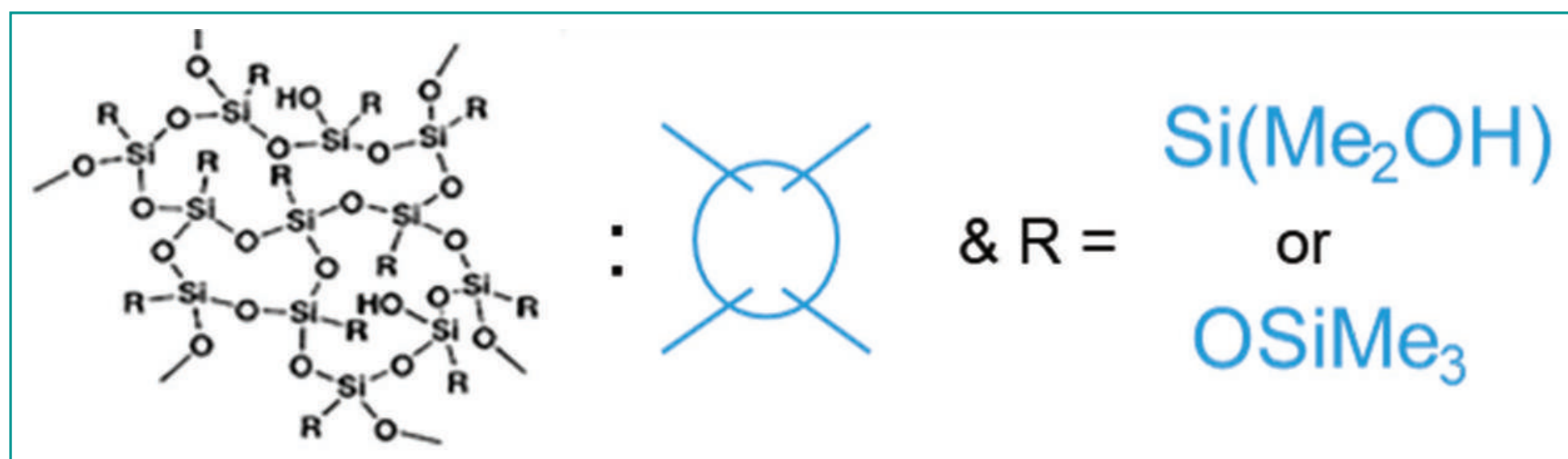
- Blends of silicone resin solubilized in different solvents (volatile or not, silicone or not)

Functional formulation benefits

- Film-former behavior (breathable film)
- Long-lasting film
- Wash-off resistance

Ahead on sustainability

- Low cyclosiloxanes content: Below 0.1%, which is below the SVHC threshold proposed by REACH regulation (EC No1907/2006)



Test methods for the characterization of film-forming performance



Occlusivity

Water loss through collagen coated with test material



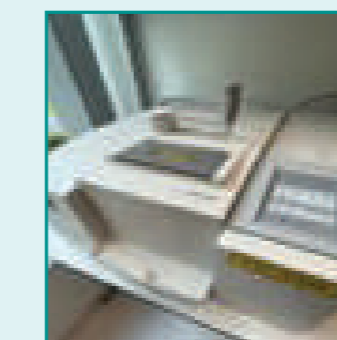
Film durability

Material coated on collagen; XRF measurement of silicone remaining on film after several friction steps



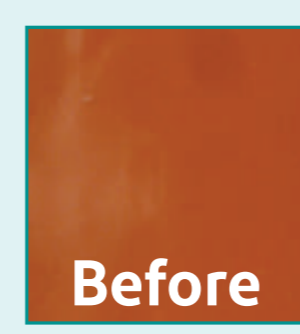
Film barrier integrity

Diffusion of dye through a collagen membrane coated with a film-former



Substantivity versus time

To assess the long-lasting film-forming effect of formulations



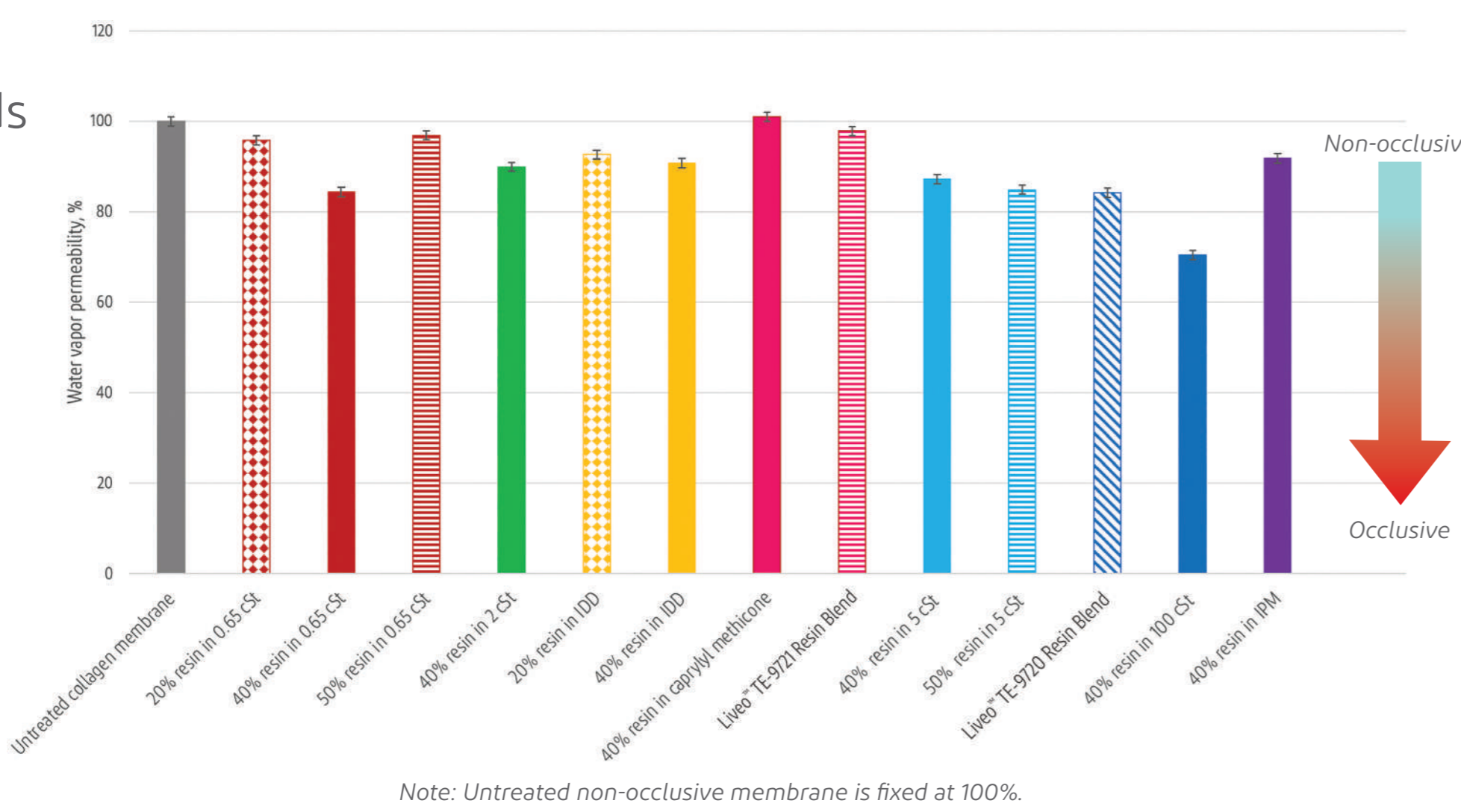
Film flexibility

Latex extension and release; observation of cracks

Results & discussion

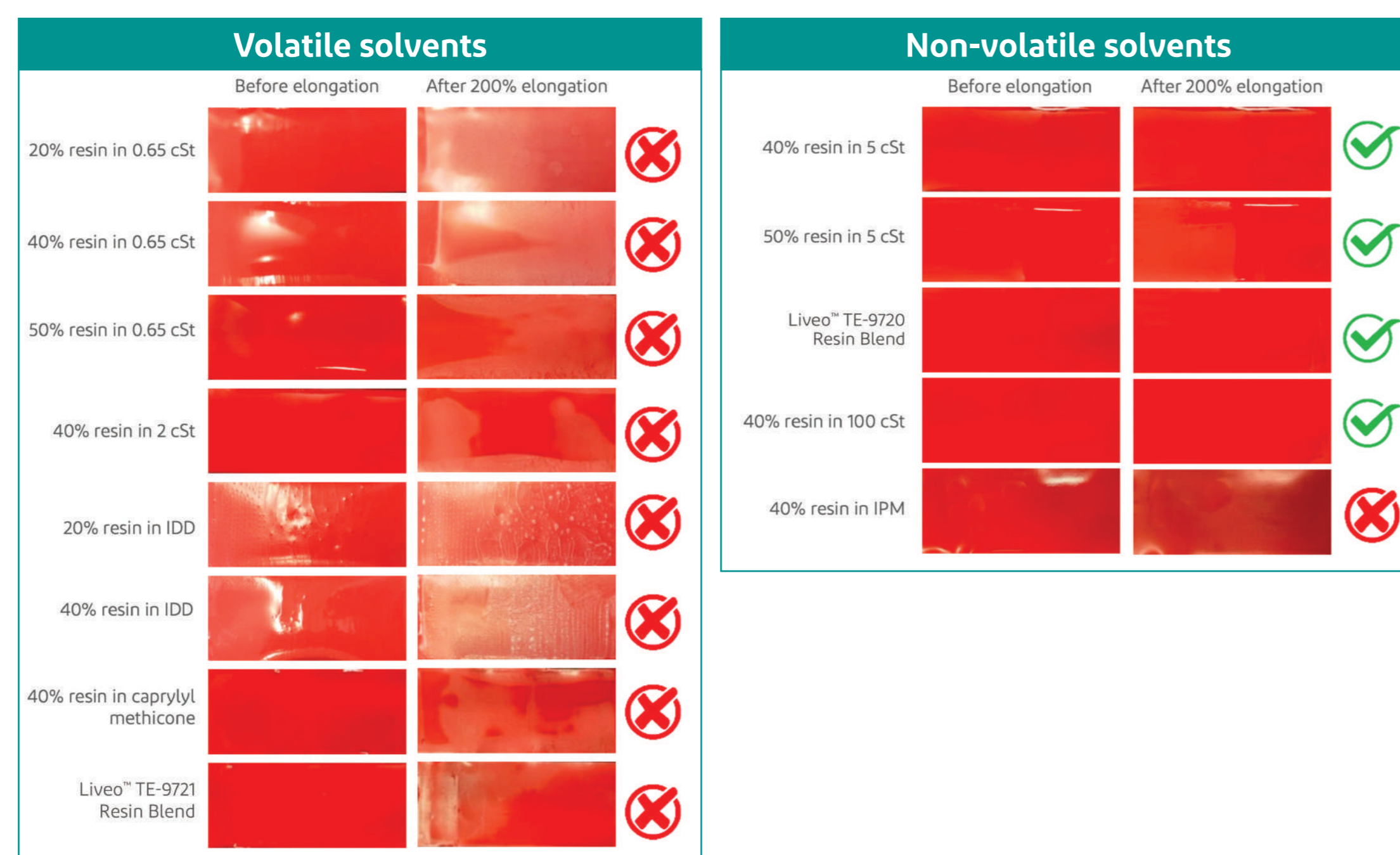
1. Occlusivity

Silicone resin blends form films that are non-occlusive.



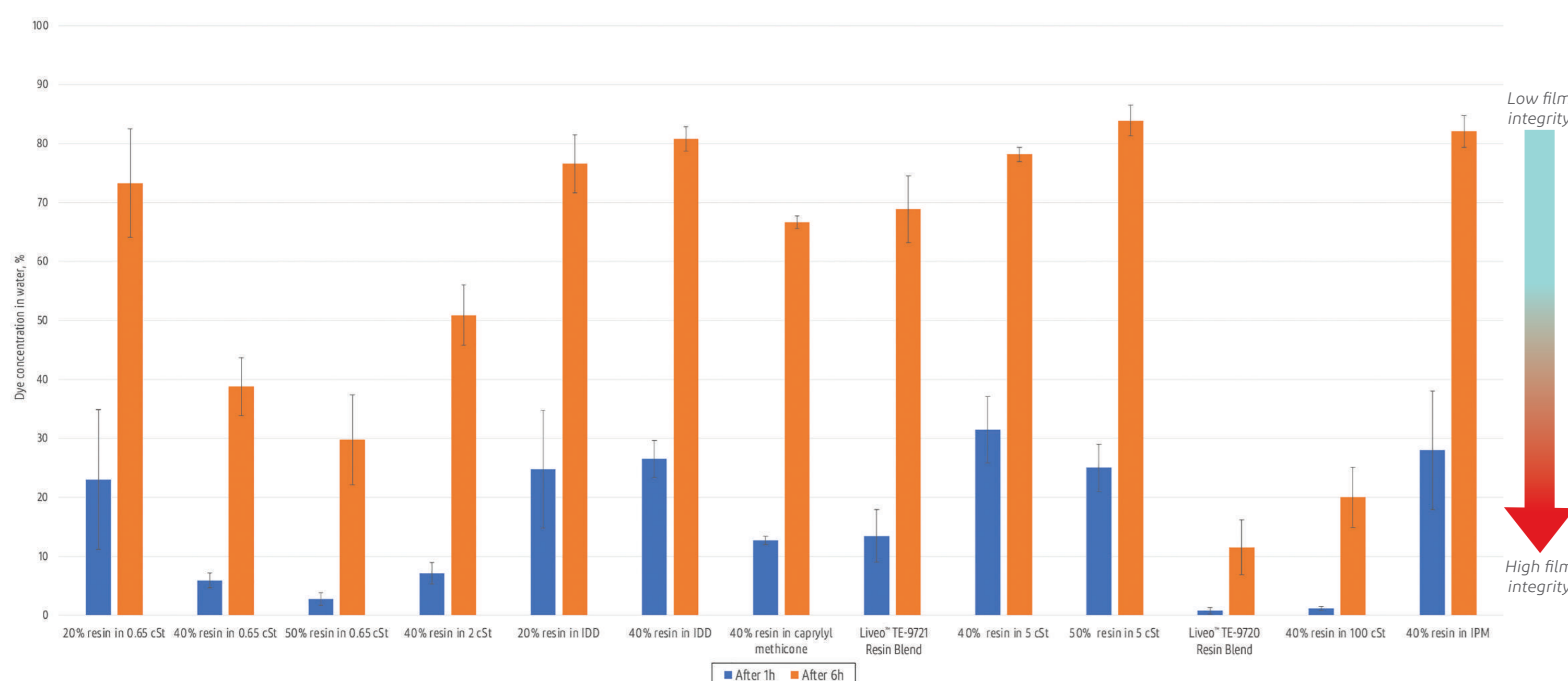
2. Flexibility

Silicone resin blends in non-volatile silicone solvents show good flexibility. Silicone resin blends in volatile solvents show less flexibility.



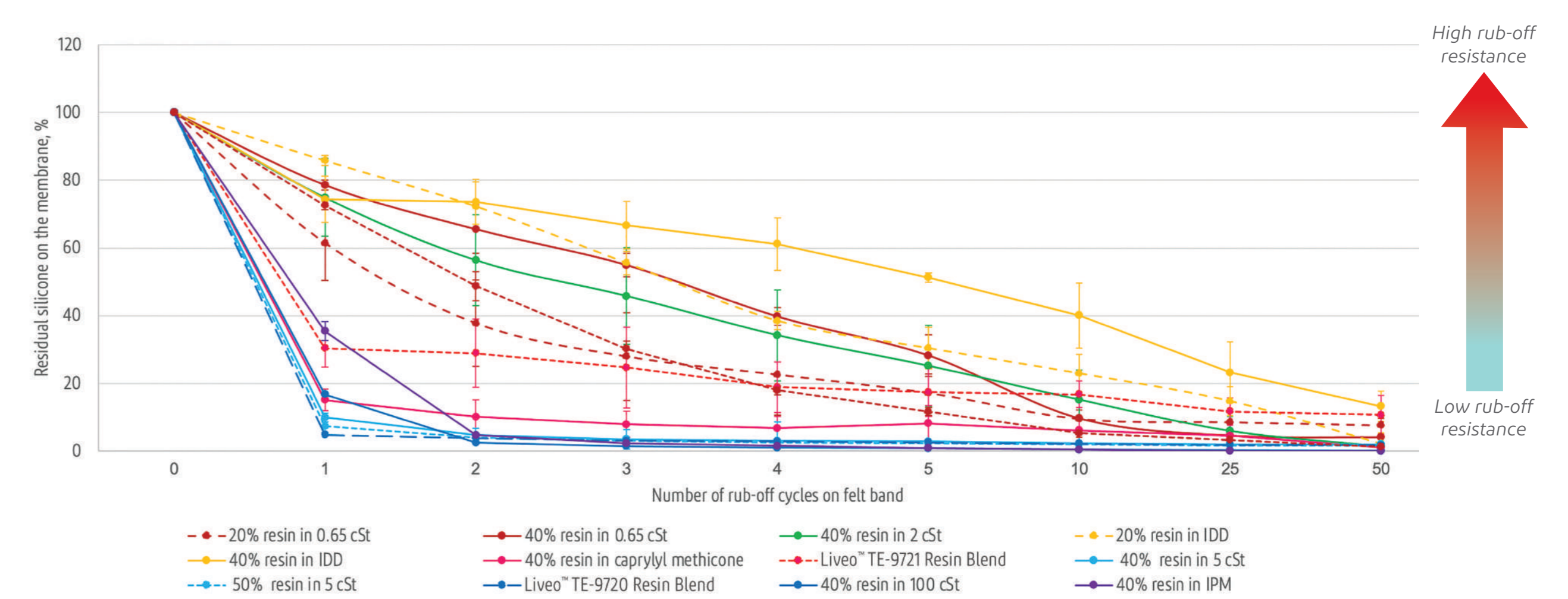
3. Integrity

Most of the silicone resin blends show good to medium integrity after 1 hour.



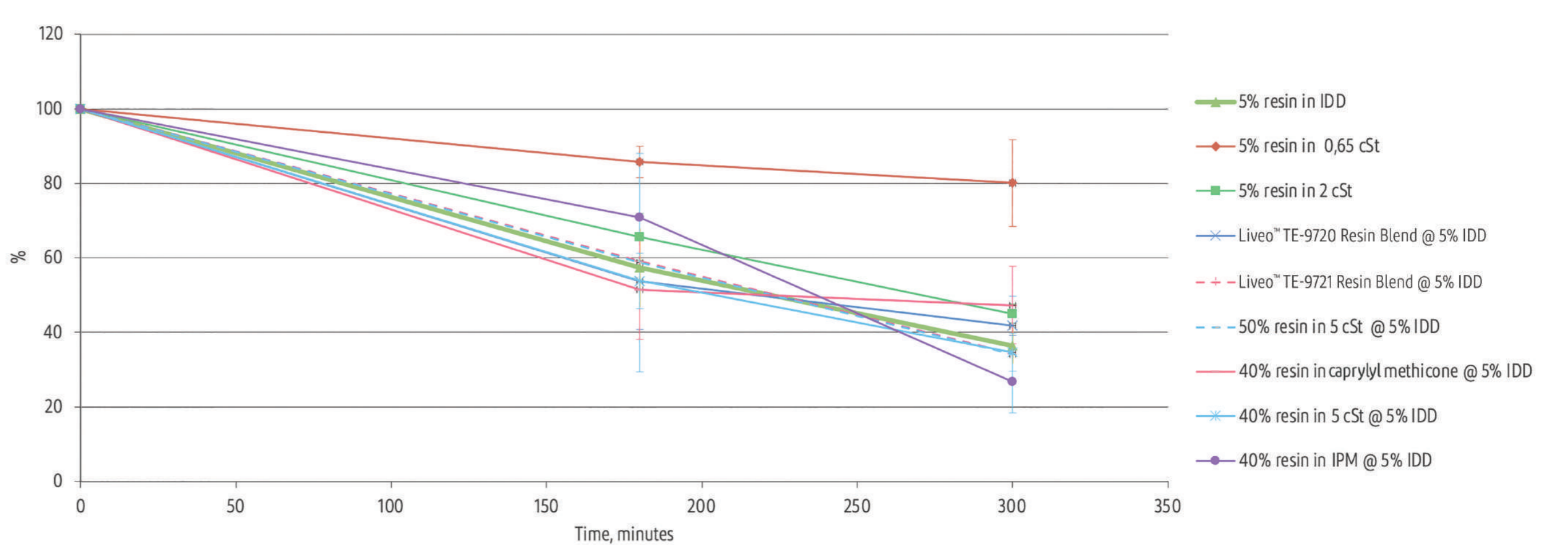
4. Rub-off resistance

- Silicone resin blends in volatile solvents demonstrate medium rub-off resistance.
- Silicone resin blends in non-volatile solvents do not show rub-off resistance.



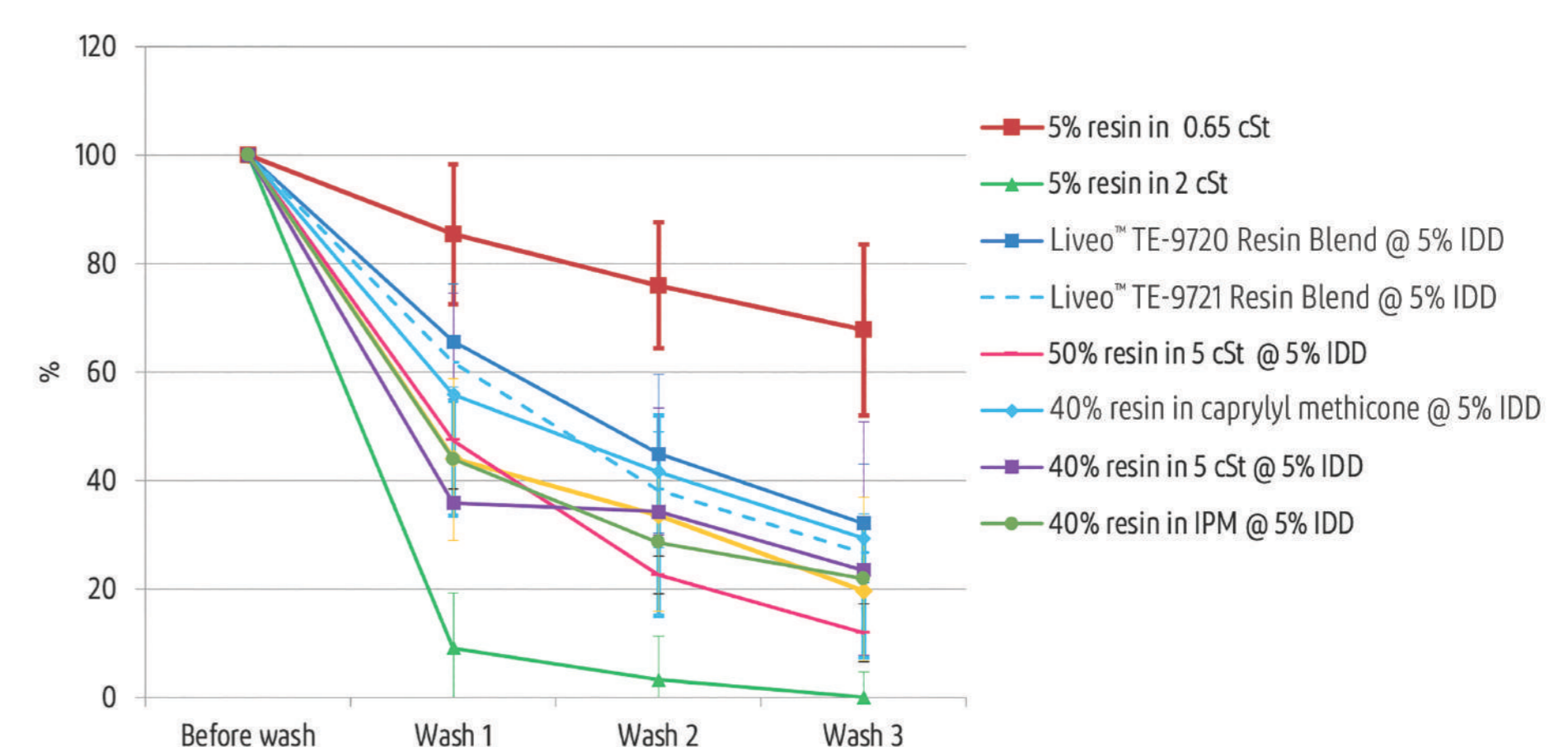
5. Substantivity versus time

- Silicone resin blend in 0.65 cSt demonstrates the highest film substantivity.
- Silicone resin blends in volatile or non-volatile solvents demonstrate medium substantivity.



6. Substantivity versus washes

- Silicone resin blend in 0.65 cSt demonstrates the highest film wash-off resistance.
- Silicone resin blends in volatile or non-volatile solvents demonstrate medium wash-off resistance.
- Silicone resin blend in 2 cSt shows poor wash-off resistance.



Conclusion

Liveo™ Silicone Resin Blend toolbox

Carrier fluid	Resin level	Drying time	Occlusivity	Film flexibility	Film integrity		Rub-off resistance	Substantivity on skin*	Substantivity versus washes*	Product name**
					1 hr	6 hr				
Silicone volatile										
HMDS, 0.65 cSt	20%	+++	Non	O	+++	O	++	+++	+++	C
HMDS, 0.65 cSt	40%	+++	Non	O	+++	O	++	+++	+++	C
HMDS, 0.65 cSt	50%	+++	Non	O	+++	++	++	+++	+++	C
Dimethicone, 2 cSt	40%	++	Non	O	+++	++	++	++	O	C
Organic volatile										
Isododecane	20%	+++	Non	O	+++	O	++	+	+	C
Isododecane	40%	+++	Non	O	+++	O	+++	+	+	C
Silicone fluid										
Dimethicone, 5 cSt	40%	O	Non	+++	+++	O	O	+	+	C
Dimethicone, 5 cSt	50%	O	Non	+++	+++	O	O	+	O	C
Dimethicone, 100 cSt	30%	O	Non	+++	+++	+++	O	++	+	TE-9720
Dimethicone, 100 cSt	40%	O	Semi	+++	+++	+++	O	++	+	C
Specialty silicone fluid										
Caprylyl Methicone	40%	+	Non	O	+++	+	O	++	+	TE-9721
Caprylyl Methicone	50%	+	Non	O	+++	+	+	++	+	
Organic solvent										
Isopropyl Myristate	40%	O	Non	O	+++	O	O	+	+	C

*For substantivity evaluation versus time and washes: Materials are diluted at 5% in solvent to avoid saturation of the peak.
**C = Concept test.

Legend: + to +++ = level of benefit (lowest to highest). O = no benefit. | Non = non-occlusive. Semi = semi-occlusive.

- DuPont offers silicone resin blend technologies with excellent compatibility profiles in order to better meet the needs of formulators developing innovative pharmaceutical and consumer healthcare topical products.
- Most of the silicone resin blends are non-occlusive materials that preserve skin health and breathability.
- The different silicone resin blend technologies are developed to offer formulation flexibility and diverse film-forming properties for topical applications.

