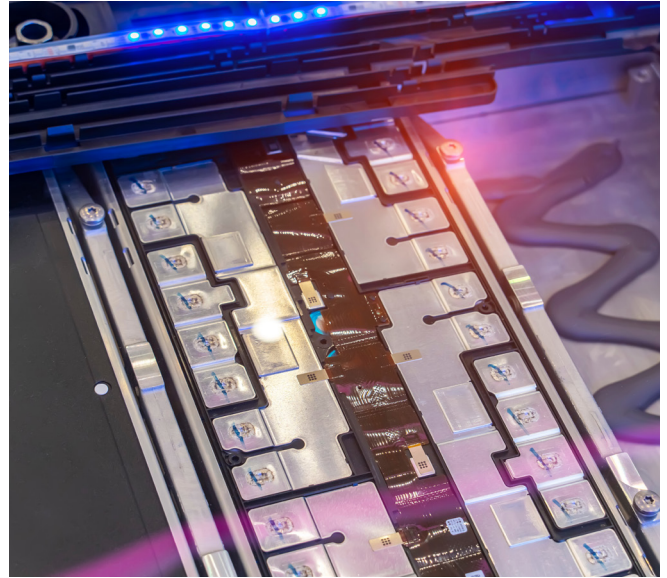
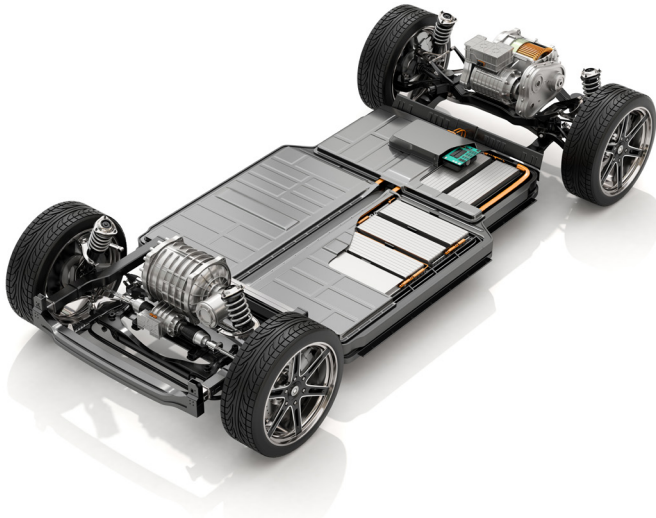


AEROXIDE® in Electric Vehicle Application

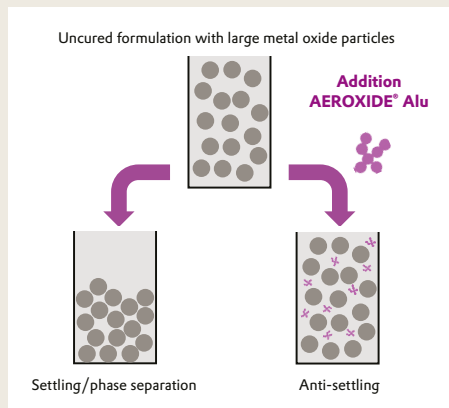
SPECIALIZED ALUMINUMOXIDES TO IMPROVE ADHESIVES & SILICONES



A driving factor for products designed for thermal management and gap filling applications such as sealings, bonding, gap fillers or encapsulants is the rapid development of electric vehicles (EV). Many of these products are based on silicone rubber or other polymers like polyurethanes, silane modified polymers (SMP) and epoxides, known for their low thermal conductivity of around 0.2 W/mK, which is often too low for practical applications and that requires the use of thermally conductive fillers such as h-boron nitride or aluminum oxide particles. However, in order to achieve meaningful increases in thermal conductivity, very high loading levels of fillers as high as loading > 70% and even higher are necessary.

Due to high density of these inorganic fillers (3–4 g/cm³) in comparison to the polymers, long-term stability of the formulation is challenging. Even at a high viscosity of these formulations, the filler particles tend to sediment over storage time resulting in phase separation. Such settling is a problem for the end-user because the formulation needs remixing prior to its application and the “hard” sedimentation layer can alter the thermal properties of the finished product.

AEROXIDE® Alu fumed aluminum oxide products are important anti-settling agents to ensure the stability of thermally conducting formulations due to their aggregate structure to control the thixotropic behavior and to additionally favor the thermal conductivity as thermally active fillers.



AEROXIDE® Alu for anti-settling

Features

- AEROXIDE® Alu with different specific BET surface area, different surface chemistry and aggregate size below 300 nm and high thermal conductivity

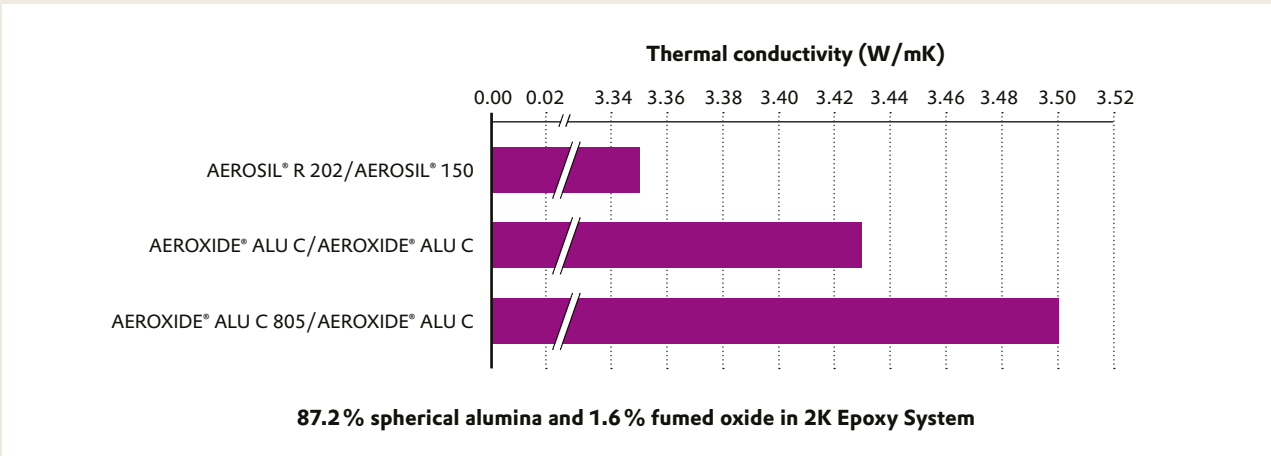
Advantages

- Efficient additive at low dosage level
- Designed rheology: high thixotropy, low impact on viscosity
- Anti-settling of large ceramic and metal oxide particles
- Improved thermal conductivity of the formulation

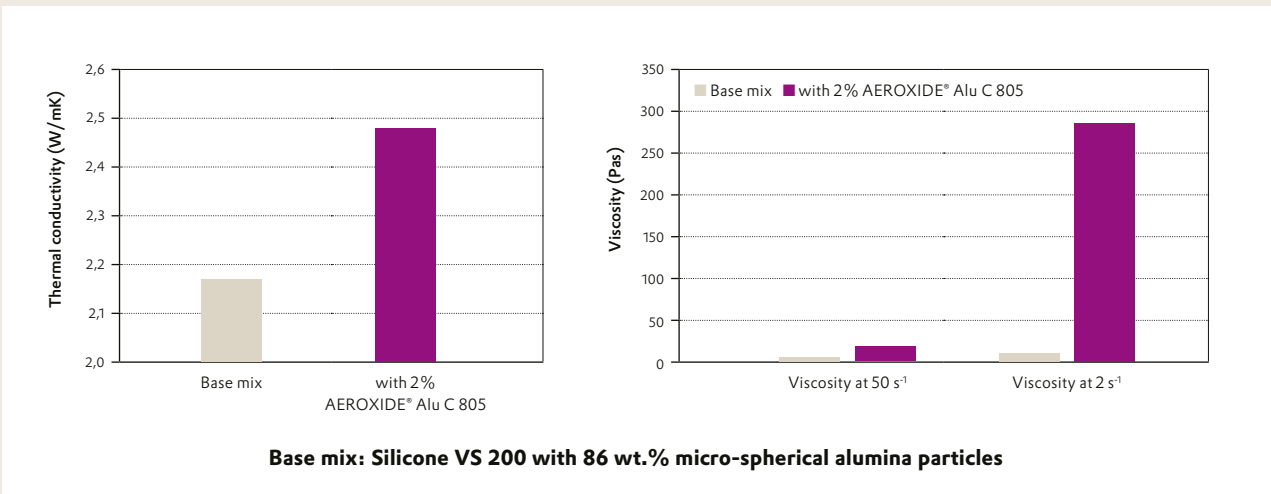
Benefits

- Formulations with high shelf-life and stable, reproducible thermal conductivity
- Improved processibility of the formulation (e.g. no segregation in dosing units)

Improved thermal conductivity by using of fumed alumina vs. fumed silica in a model 2K epoxy system



Improved thermal conductivity and high thixotropy by incorporation of fumed alumina in silicone base formulation



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