Technologies to Products…On the Leading Edge

NanoSperse 484: Non-Ionic Surfactant

The value and benefit of TPL's NanOxide™ nano-powders can only be realized if they are uniformly dispersed. NanoSperse 484 has been developed to aid in the dispersion of TPL's nano-sized oxide and titanate powders in both aqueous and organic solvents. It is an engineered high molecular weight steric wetting agent designed to stabilize these inorganic powders and increase the affinity between the powder and the polymer systems to promote uniform wetting and prevent aggregated particles. NanoSperse reduces viscosity and aids in the fabrication of highly loaded particle slurries.

NanoSperse 484 is solvent-free and effectively reduces the viscosity in aqueous, "low VOC" and "VOC-free" systems.

Typical Properties

Density, 20°C in g/ml:	1.08
Non-Volatiles (%)	79
Flash Point:	>100°C
Acid Value (mg/KOH/g):	95
Amine Value (mg/KOH/g):	95
Weight (lb/US gallon):	8.90

Applications

NanoSperse 484 can be successfully used as a dispersion agent in:

- Binder systems commonly used in multilayer ceramic capacitors (MLCC) manufacturing
- Solvent/particle slurries using a wide range of standard organic solvents
- Loaded thermoplastic and thermosetting polymers for composites
- NanOxide™ or other nanopowder inorganic loaded slurries

Processing

Due to the extremely small particle size and corresponding high surface areas, surfactant concentrations required to achieve uniform particle dispersions are higher than that required fore conventional micron sized powders. Even minor changes in particle size (surface area) and percentage of powder loading can impact the amount of NanoSperse 484 required. Typical concentrations can vary from 1.5% to 3% by weight; the amount required increasing as a function of both increased surface area and solid loading. For optimum dispersion, NanoSperse should be incorporated into the mil base before addition of the powders.

Please keep in mind when developing your process using TPL's NanOxide™ nanopowders:

- The manufacturing process for Barium, Strontium and other titanate powders includes a drying step which can induce soft agglomeration (roughly 75 micron size particles). These agglomerates are easily broken up by ultrasonication or ball milling.
- Some harder agglomerates can also exist in the powder comprising several to tens of particles. Because of the extremely fine particle size, these agglomerates require more energy than is traditionally required for larger, micron sized particles. When switching form micron sized powder to nano-sized powder it may be necessary to lengthen ball milling time by a factor of two or three.

Packaging and Handling

NanoSperse is available in pint, quart and gallon containers. We also have 5 and 55 gallon containers upon request. Shelf life is 3 years from date of shipment; however, containers should be tightly closed immediately after each use to assure maximum shelf life.

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Important Notice
Typical properties should not be construed as a specification. Before using this product you must evaluate it and determine it's suitability for your intended application.

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