



Nanopowders

Nanodispersions

...dispersed nanopowders

Stabilized Particles

*n*Gimat uses a patented Combustion Chemical Vapor Condensation (CCVC) technology to manufacture metal, metal oxide, and mixed metal oxide nanomaterials less than 100 nm in size. The CCVC process has built-in capability to control the size, purity, crystallinity, shape, morphology, and composition of mixed metals in complex metal oxides. As the nanomaterials produced are metal oxides, most can be dispersed in a variety of medium with or without dispersants. There are two methods used to stabilize a nanoparticle in a solvent/host matrix: steric repulsion and electrostatic repulsion of the nanoparticles. The nanoparticles produced have high surface area, and the surface can be modified specifically targeting one of these two properties leading to stable dispersions.

Some Parameters Used to Control Dispersion Quality:

- **Nanopowder Size:** For a specific loading, size of the nanopowder used creates different consistency of the eventual nanodispersion.
- **Dispersant:** A variety of dispersants are used to obtain a high loading of nanopowder in dispersed phase in specific medium.
- **Medium:** Aqueous or non-aqueous mediums are used.
- **pH:** Metal oxide nanoparticles are sensitive to pH of the medium; they agglomerate or repel each other at different pH.

Representative Samples of Nanodispersions

Nanodispersion	Loadings	Solvent / Host	APS	Dispersant
Ceria	5 to 25%	Water or alcohol	50 nm	None
Nd:YAG	5 to 40%	Water or alcohol	50 nm	None
CoAlO ₄	5 to 40%	Water	50 nm	None
Hydroxyapatite	10%	Water	<100 nm	None
Zirconium Silicate	5 to 20%	Water	<100 nm	1 %



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nanoEngineered Materials™

The Company. *n*Gimat, located inside the perimeter of Atlanta, is an intellectual property and manufacturing company that engineers nanopowders, thin films, and devices. Our facilities are equipped with instrumentation to perform cutting edge materials research, development, and manufacturing. The scientists and engineers at *n*Gimat bring backgrounds in materials science, chemistry, physics, and mechanical/chemical/electrical engineering to the challenges of engineering nanomaterials. In addition, our analytical personnel provide rapid turn-around times and state-of-the-art materials analysis to support our materials development.

Nanopowders

Nanopigments

...colors from nanomaterials

Nanopowder Technology

- The NanoSpray Combustion Processing technology is a platform method that relies on *nGimat's* proprietary Nanomiser[®] Device to produce aerosols with controllable droplet size.
- The process is used to convert a starting liquid solution containing chemical precursors into an ultra-fine aerosol that is efficiently combusted into a flame to produce nanopowders via the Combustion Chemical Vapor Condensation (CCVC) process.
- Ultra-fine atomization with the Nanomiser Device enables use of low-cost, environmentally friendly, soluble precursors without concern for their vapor pressure.



Stable, Durable Color

nGimat's nanopigments are metal oxides with or without metal doping to obtain the required color, hue, and brightness. During manufacture of nanopigments with our proprietary Nanomiser[®] Device in the patented CCVC process, the metal oxides go through a high-temperature reactor before collecting in a baghouse. This leads to formation of nanopigments that are highly stable to temperature and oxidation, durable to sunlight, gases, rain, most organic solvents, and tolerant to pH change.



Applications

nGimat's nanopigments have an average particle size (APS) of less than 100 nm. The manufacturing process allows tailoring of the size of the nanoparticles for an application. The nanopigments developed and manufactured by *nGimat* can be used as, for example, a coloring agent in paint formulations, engraving on ceramic tiles to create intricate designs, a reflecting surface for thermal management, and an ultra-violet radiation block in cosmetics and body lotions for sun screens.



For more information on *nGimat's* nanopigments or nanodispersions,

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