

...engineering practical nanotechnology

Target Markets

Nanopowders

- Electronics
- Fuel Cell Layers
- Catalysis
- Medical & Pharmaceutical
- Cosmetics
- Pigments
- Clean Combustion

Barrier Coatings

- Food & Beverage Packaging
- Gas
- Moisture
- Anti-corrosion

Electronics & Optics

- ReliaSense™ Optical Sensor
- Photonic Devices
- Embedded Passives
- Dielectrics & Conductors
- Thin Polymers & Composites

RF Wireless

- Tunable Filters for Cellular Phones
- Phase Shifters for Wireless LANs, PDAs, etc.

nGimat™ Co.

5315 Peachtree Industrial Blvd.
 Atlanta, GA 30341
 678-287-2400
 678-287-3997 FAX
 www.ngimat.com

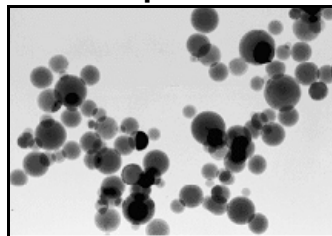
*nano*Engineered Materials™

nGimat is a manufacturer and innovator of engineered nanopowders and thin films using its proprietary open-atmosphere NanoSpraySM Combustion Processing technology. The company was established in 1994 with a vision to bring unique materials solutions to industries looking for an economical alternative to traditional thin film and nanopowder technologies. Today, we develop cost-effective coating solutions and nanopowder options to fit where other techniques fall short on performance or are cost prohibitive.

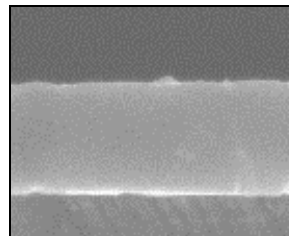
nGimat's objective is to work with you to meet your requirements and to offer you tailored materials solutions.

The product development target markets listed at left summarize nGimat's technology focus. In addition to the foundational science of nanopowders and thin films, the company has developed devices and processes that use nanotechnology in practical ways. The back of this sheet gives a short technology overview. If you are interested in more information about any of these areas, please contact us.

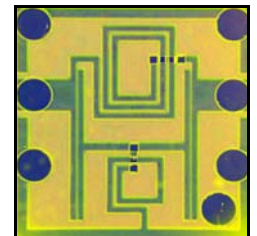
Nanopowders



Thin Films



Devices



nGimat Overview

Options

- We have worked with metal, ceramic, polymer, and composite thin films on substrates ranging from metal to ceramic to plastic.
- Our nanopowder capabilities allow complex compositions, tailored morphologies, and scalability.

Flexibility

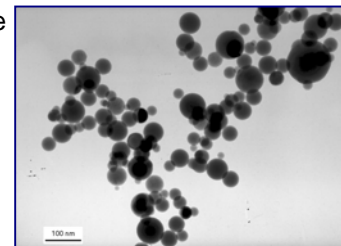
- We work with you to deposit thin film materials or to produce nanopowder compositions you need for your applications.
- If you just need a particular materials property, our scientists and engineers can work with you to suggest and develop the materials that meet your requirements.

Innovation

- The company has a healthy portfolio of patents and alliances with industry leaders in several market segments and continually strives to maintain its knowledge base.
- The scientists and engineers at nGimat look beyond what has been done to find solutions that have not been tried due to a previous lack of technology or to enable new innovations in nanotechnology.

Nanopowders

NanoSpray Combustion Processing is used to produce up to kilograms of nanopowders in our pilot-scale facilities. The benefits of *nGimat*'s technology include simplicity of equipment, flexibility to form complex compositions, and increased production rates. Please visit our website to see a list of currently available nanopowders, or contact us directly with specific requirements.



Typical Characteristics

- 5 to >240 m²/gr average surface area
- 5 to 100 nm primary particle size
- Mixed metal oxides, metals, non-oxides composition

Thin Films

Thin films of ceramics, certain metals, and polymers can be deposited onto ceramics, metals, and polymers. NanoSpray Combustion Processing enables over 100 coating materials. If you are interested in learning more about our capabilities or are interested in a particular element or compound, please contact us to discuss your requirements.

Metals	Ceramics	Others
Ag, Au, Ir, Ni, Rh, Pt	Al ₂ O ₃ , Al ₂ O ₃ •MgO, BaTiO ₃ , BST, doped-CeO ₂ , Cr ₂ O ₃ , Cu _x O, ITO, LaAlO ₃ , MgO, Mn ₂ O ₃ , PbTiO ₃ , SiO ₂ , Spinel (e.g. NiAl ₂ O ₄ , NiCr ₂ O ₄), Silica Glasses, SnO ₂ , SrTiO ₃ , WO ₃ , YBa ₂ Cu ₃ O _x , YIG, YSZ, ZrO ₂ , ZnO, and as dopants	polyimides, nafion, epoxies, etc.; composites of metals, ceramics, & polymers

Devices

With collaboration from other agencies, *nGimat* has developed two types of devices. The **ReliaSense™ Optical Sensor** allows real-time measurement of chemicals and biomolecules in liquids and gases. Our **Analog Ferroelectric Phase Shifters** (continuously variable - L, S, C-Band) are applicable to broadband, satellite communication, phased array radars, and antennas.

The Technology. NanoSpray Combustion Processing is a platform technology that relies on *nGimat*'s proprietary Nanomiser® Device to produce aerosols with controllable droplet size distribution. In Combustion Chemical Vapor Condensation (CCVC) production of nanopowders, NanoSpray Combustion Processing 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. Atomization with the Nanomiser Device enables use of soluble precursors without concern for vapor pressure. In the Combustion Chemical Vapor Deposition (CCVD) process for depositing thin films, on the other hand, a substrate (a material to be coated) is simply translated an appropriate distance in front of the flame. Heat from the flame provides energy needed to vaporize the droplets and to react the precursors and deposit on the substrate.

The Company. Our facilities are equipped with instrumentation to perform cutting edge materials research, development, and manufacturing. The scientists and engineers at *nGimat* bring backgrounds in materials science, chemistry, physics, mechanical/chemical/electrical engineering, and biochemistry 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.

Customer Solutions

nGimat offers its customers product sales, license arrangements, and R&D services.

Development and sale of components and advanced nano-materials —RF, nanopowders, and optical sensor applications

Research and development services for emerging technologies—all markets

Licensing under strategic alliances and joint ventures of CCVD process and advanced material technology—select applications of nanotechnology, barrier coatings and electronics

Sale of CCVD coating equipment in association with customer licensees

Please visit us at www.ngimat.com or contact us directly for details or more information about customer solutions at *nGimat*.

We at *nGimat* Co. would like to discuss with you your materials challenges or nanopowder / thin films needs.

Please visit us at www.ngimat.com or contact us directly:

Phone: 678-287-2400

FAX: 678-287-3997

Email: customer@ngimat.com