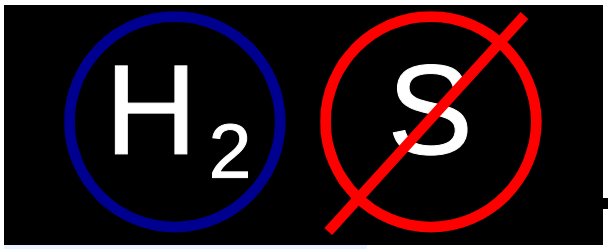

Materials for Fuels

Hydrogen Generation, Desulfurization

...catalyst and sorbent nanomaterials

Customer Solutions

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

Development and sale of components and advanced nano-materials

Research and development services for emerging technologies

Licensing under strategic alliances and joint ventures of CCVD process and advanced material technology

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 *n*Gimat.

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*nano*Engineered Materials™

Hydrogen Generation

Hydrocarbon fuels can be reformed with catalysts in the presence of steam to make hydrogen fuel, an essential gas for next-generation power sources, refining processes, electronics applications, and food processing. To enhance hydrogen production capacity and purity, new catalysts must be used with distinct performance advantages. Additionally, lowering reforming reaction temperature (less than 400 ºC) is attractive if a lowered process energy input is desired. Nanomaterials offer enhanced hydrogen production capacity per unit weight at low temperatures when compared with larger particle materials. *n*Gimat™ has prepared oxide nanomaterials that have exhibited hydrogen production capacities more than seventy times higher than leading micron-size materials. The back of this sheet provides more data on *n*Gimat's materials.

***n*Gimat's nanopowders, made using its Combustion Chemical Vapor Condensation (CCVC) process via the NanoSpray℠ Combustion Processing technology, and its subsequent composites make high performance, low-cost catalysts for fuel reforming.**

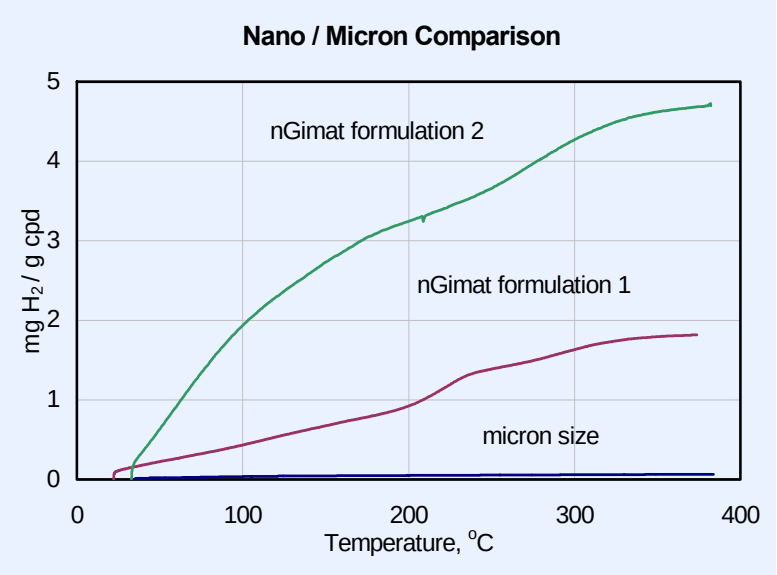
Desulfurization

Hydrogen sulfide and organosulfur species are typically present in heavy hydrocarbon fuels at concentrations ranging from hundreds of ppm to several percent. To comply with increasingly strict emissions standards, commercial and military entities must filter sulfur-bearing compounds out of fuels either pre or post combustion. Nanomaterials offer high capacity regenerable sulfur removal in lightweight low-cost systems. *n*Gimat has prepared fluorite nanomaterials that have exhibited sulfur removal capacities more than 20x higher than leading Zn-based micron-sized materials. More data is available on the back of this sheet.

***n*Gimat's flame-generated nanopowders and composites make high-performance, low-cost sorbents for fuel desulfurization.**

The Technology. The NanoSpray Combustion Process is a platform technology that relies on *n*Gimat's proprietary Nanomiser® Device to produce aerosols with controllable droplet size. The NanoSpray Combustion 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. Ultra-fine atomization with the Nanomiser Device enables use of low-cost, environmentally-friendly, soluble precursors without concern for their vapor pressure.

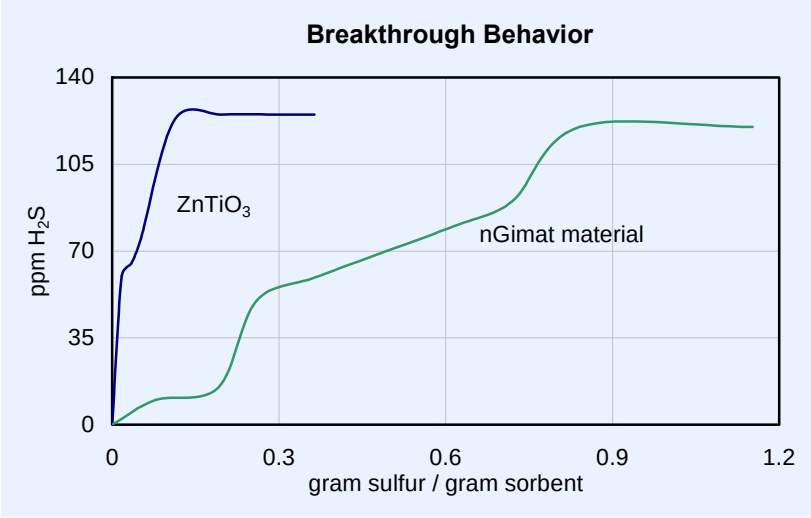
Hydrogen Generation. This figure shows comparative hydrogen generation behavior between micron-size, *n*Gimat formulation 1, and *n*Gimat formulation 2 materials. *n*Gimat formulation 2 powders have superior catalytic activity below 400°C by nearly two orders of magnitude.



Comparative hydrogen generation capacity between standard fluorite-based micron-size powder and *n*Gimat nanopowder. Conditions: furnace ramp (10°C/min) in pure methane.

Desulfurization. This figure shows comparative sulfur removal capacity behavior between two materials. The larger particle Zn-based powders have 10-20 times less sulfur gettering capacity than the nanomaterials, and gaseous levels rapidly rise after a brief period. The nanopowders can readily be used for many sorption-regeneration cycles.

Comparative breakthrough curve between standard zinc titanate micron-size powder and *n*Gimat nanopowder. Conditions: 1% H_2S 3.8 lpm; zinc titanate sorbent charge: 5.2 g; nGimat powder charge: 2 g.



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, 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.

For more information on *n*Gimat's work with Hydrogen Generation or Desulfurization,
please visit us at www.ngimat.com or contact us at
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