



nGimat™ Co.
nanoEngineered Materials™



LEADERSHIP STATEMENT

nGimat Co. is a leading nanoengineered materials provider of customized and affordable solutions to critical business needs. By working closely with customers to define their needs, nGimat can create never before attained product enhancements through the unique performance of its nanomaterials. As an intellectual property company, nGimat manufactures engineered nanomaterials in the following areas: nanopowders, thin film coatings, and devices. nGimat's NanoSpraySM Combustion Process technology enables synthesis of thin films and nanoparticles. These processes are easily scalable and amenable to mass manufacturing, thereby enabling low-cost production of engineering materials with controlled composition, size, and morphology.

Company values

**OPEN-MINDEDNESS
RESPONSIBILITY
TEAMWORK
ACHIEVEMENT**

CORE COMPETENCIES

nGimat, 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 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.

CORE ADVANTAGE

The key advantages of nGimat's patented NanoSpraySM Combustion Processing technology include:

- ▶ Open-atmosphere processing;
- ▶ Use of inexpensive, environmentally friendly, soluble chemical reagents;
- ▶ Production of tailored and complex material solutions; and
- ▶ Continuous manufacturing capability.

Sustainable competitive advantage

nGimatTM has expertise in nanomaterial discovery, production, and processing in final products. The Company has more than 40 U.S. patents and 70 non-U.S. patents issued, and over 60 patent applications pending covering its raw materials, processes, equipment, composition of matter, intermediate products and final products.

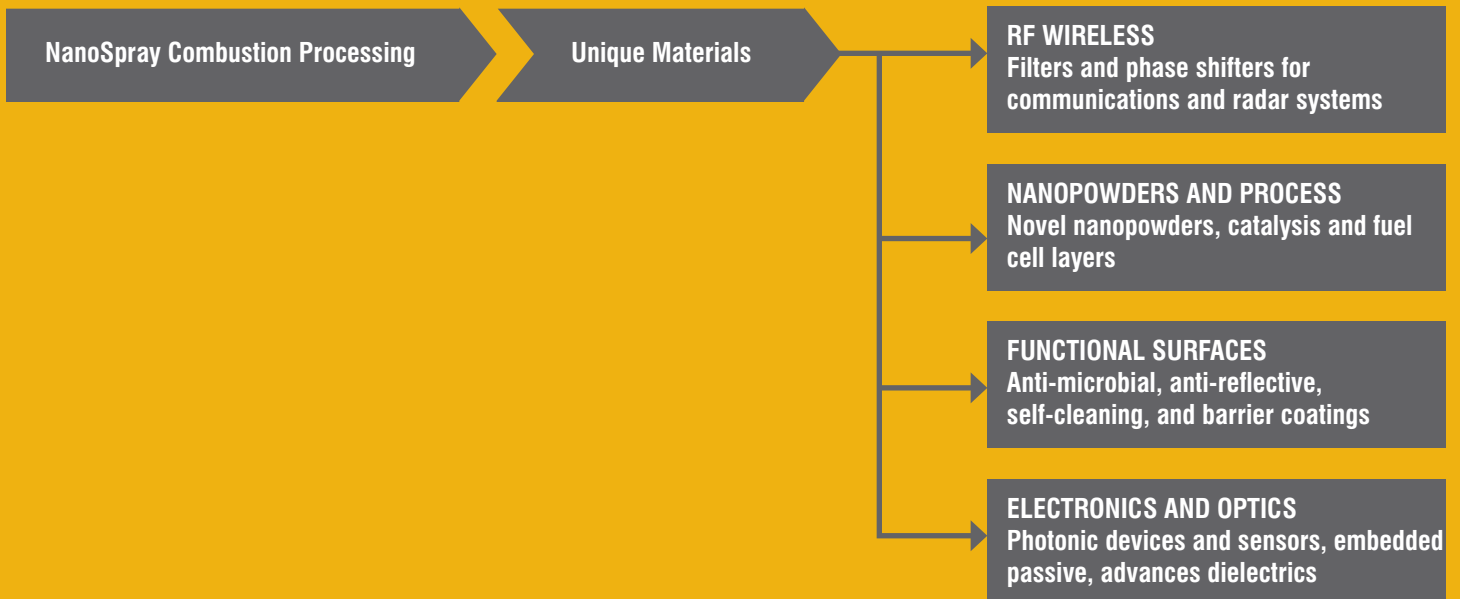
nGimat has a group of dedicated experts with years of experience in their particular fields. nGimat is commercializing products and accesses markets through forming strategic alliances with industrial leaders.

Value proposition

nGimat's NanoSpraySM Combustion Processing technology allows the production of next-generation nanoEngineered MaterialsTM, including nanopowders and thin films at a cost that is 2x to 10x lower than that for competitive processes; providing low cost solutions to existing and emerging applications. The products have comparable or superior performances to those being replaced.

nGimat uses NanoSpray Combustion Processing to develop unique materials as coatings and nanopowders for a wide range of end products.

nGIMAT FOCUS



PRODUCTS/SERVICES/ OTHER APPLICATION AREAS OF TECHNOLOGY

nGimat is focusing its product development, sales, and licensing in four target markets:

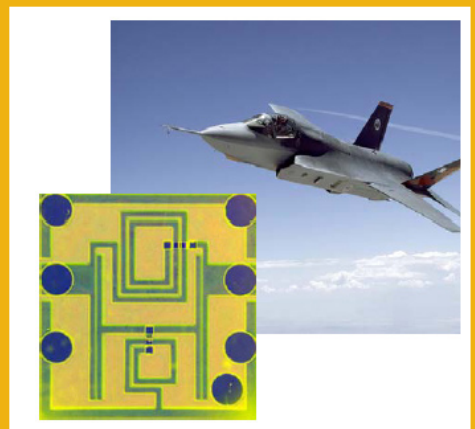
- ▶ RF wireless components,
- ▶ Nanopowders and NanoSpray processes,
- ▶ Functional surfaces, and
- ▶ Electronic and optical coatings.

Range of products

RF Wireless

Historically, complex oxides in the RF/microwave domain, such as barium strontium titanate (BST), have not been applied to commercial products due to the difficulty in producing high-quality thin films. nGimat has developed its proprietary Combustion Chemical Vapor Deposition (CCVD) coating process for depositing epitaxial BST dielectric coatings on sapphire that provide the building blocks for a host of microwave and RF broadband devices that can be used in communications and radar applications.

- ▶ Phase Shifters - Traditionally, phase shifters have not been used in commercial applications because of the high cost of current technology. nGimat's phase shifters offer compelling performance at a low cost. nGimat's current phase shifter product line covers the center frequencies from 1 to 40GHz. Contact us directly for custom design needs.
- ▶ Tunable Filters - Ferroelectric tunable filters have been envisioned, but never commercially developed. nGimat's nanolayered BST dielectric coatings enable wireless products to be tuned to multiple frequency bands using a single DC control voltage. For cellular applications, the use of frequency-agile filters will result in 30 - 40% lower transmitter power, longer battery life, reduced handset size, weight and cost as well as the ability to operate in multiple frequency bands with a single device. nGimat offers duplexers that operate in the U.S. PCS cellular band at 1.9GHz as well as in GSM handsets. nGimat's tunable filter technology will permit a single filter to operate in both the 800MHz and 900MHz bands, with the handset dynamically tuning the filter to the correct frequency. A second tunable filter will handle the 1800 and 1900MHz bands. This allows a quad band handset to be constructed with the same complexity as today's dual band handset.



Functional Surfaces

nGimat's NanoSpray Combustion Processing technology enables the development of highly functionalized surfaces. These nano coatings can be used for multiple applications:

- ▶ Anti-microbial Coatings
- ▶ Anti-reflective Coatings
- ▶ Self-cleaning Surfaces
- ▶ Barrier Coatings
- ▶ Adhesion interface

The sample at right illustrates one such coated surface. Here, the water droplets are nearly perfect spheres sitting on the coated glass surface. The substrate is borosilicate glass and the water contact angle is $>165^\circ$ while the rolling angle is $<5^\circ$.

For self-cleaning coatings, nGimat has engineered nanocoatings that overcome the optical clarity limitations of most coating technologies. In fact, nGimat coating has been demonstrated to improve transmittance with respect to the bare substrate due to the anti-reflective nature of the coating – a property that is especially beneficial to solar cell applications.

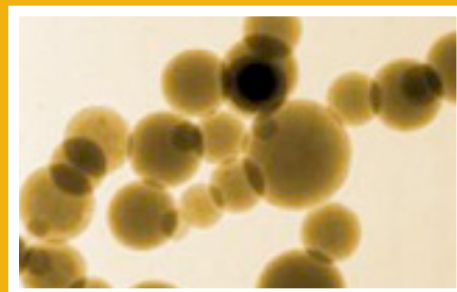
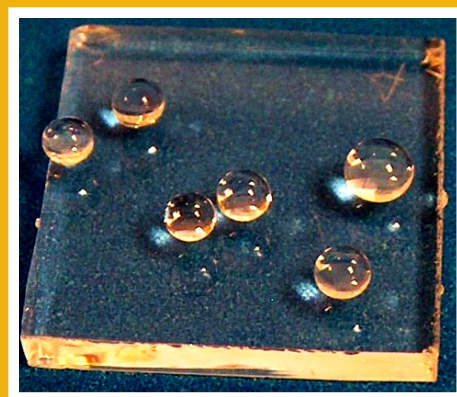
nGimat has expanded the self-cleaning coating technology from glass to a wide variety of substrates.

Nanopowders

Using nGimat's proprietary NanoSpray Combustion Processing technology enables the production of nanopowders of almost any elemental combination. nGimat's Nanomiser Device allows ultra-fine atomization with the use of low-cost, environmentally friendly, soluble precursors without concern for their vapor pressure. nGimat supplies the widest range of nanopowders and some are offered through strategic alliance with Sigma-Aldrich.

Typical Specifications

| | |
|------------------------|--|
| Average Surface Area | 5 to >240 m ² /gr |
| Primary Particle Size | 5 to 100 nm average |
| Primary Particle Range | $>99.9\%$ of particles <100 nm for <50 nm average |
| Composition | Most elements as simple oxides, mixed metal oxides, select metals, and non-oxides. Numerous surface modifiers can be formed for passivation and surface functionalization. |
| Quantity | grams to 100+ kilograms |
| Purity | 98% to 99.99% |



Electronics & Optics

nGimat's proprietary NanoSpray Combustion Processing technology has enabled the development of next-generation electronics & optics:

- ▶ Sensors
- ▶ Embedded Passives
- ▶ Dielectrics & Conductors
- ▶ Thin Polymers & Composites

Real-time, reliable detection of chemical and biological agents is necessary in many applications, yet practical or portable sensor systems that are easily operated either are not available or may not have requisite sensitivity and response. Real-time detection is the premise of nGimat's ReliaSense optical sensor. The device is an interferometric waveguide sensor based on an integrated optical chip fabricated using standard photolithographic processes. Each interferometer on the optical chip can be nano-coated with a monolayer of selective chemistry specific to a particular biological or chemical agent, thereby, allowing simultaneous real time detection of multiple targeted agents of your choice. Applications of the ReliaSense optical sensor include - food inspection, chemical or petroleum production, drinking water, monitoring, point of care medical diagnostics, as well as alert of chemical or biological terrorist attacks. To date, the sensor has been used to for real-time detection of the following: e. coli, Mycobacterium tuberculosis rRNA, Influenza A virus, Salmonella typhimurium, Human chorionic gonadotropin (hCG), Ammonia and various organic molecules.



PRODUCTS & SERVICES

Nanopowders

Catalysis & Sorption

Energy

Electronics & Lasers

Polymers, Cosmetics, &

Pigments

Medical & Pharmaceutical

Clean Burning Engines

Functional Surfaces

Anti-microbial Coatings

Anti-reflective Coatings

Self-cleaning Surfaces

Barrier Coatings

Electronics & Optics

Sensors

Embedded Passives

Dielectrics & Conductors

Thin Polymers & Composites

RF Wireless

Phase Shifters

Tunable Filters

Green Solvent Solutions

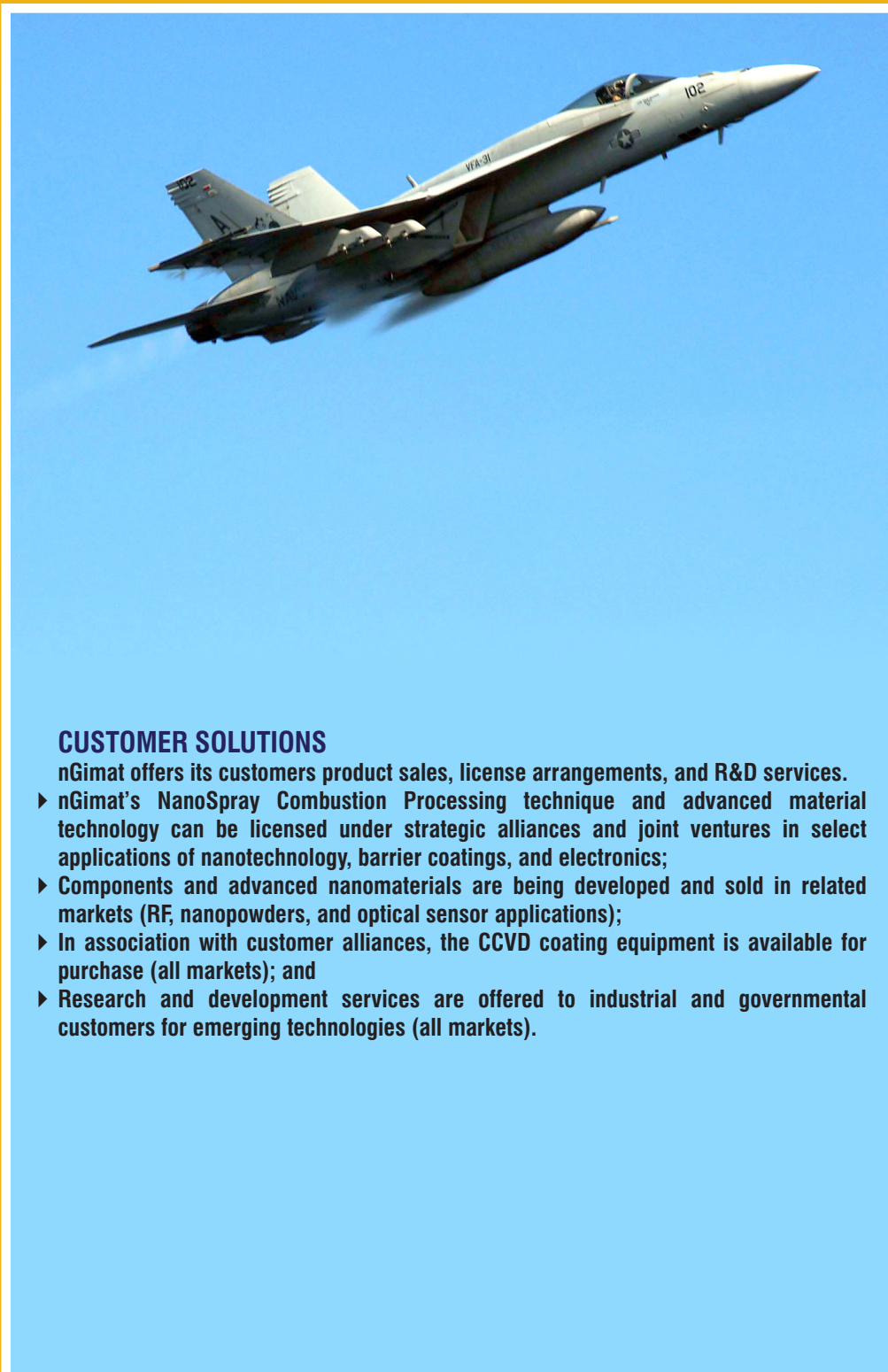
Ionic Liquids

Solvent Replacement Software

Purchase Green Solvent

▶ **Wizard**

▶ **Software License Agreement**



CUSTOMER SOLUTIONS

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

- ▶ nGimat's NanoSpray Combustion Processing technique and advanced material technology can be licensed under strategic alliances and joint ventures in select applications of nanotechnology, barrier coatings, and electronics;
- ▶ Components and advanced nanomaterials are being developed and sold in related markets (RF, nanopowders, and optical sensor applications);
- ▶ In association with customer alliances, the CCVD coating equipment is available for purchase (all markets); and
- ▶ Research and development services are offered to industrial and governmental customers for emerging technologies (all markets).

CURRENT R&D ACTIVITIES

nGimat also has active programs of government development grants from agencies such as the National Science Foundation, the Department of Energy, the Department of Defense (Navy, Army, Air Force and Missile Defense Agency), the National Institute of Health, and NASA. Some of the example development projects include:

- ▶ Diffusion, Oxidation, and Thermal Barrier Coatings on Metallic and Ceramic Substrates Using Cost-Effective Combustion Chemical Vapor Deposition Process, DOD/ BMDO
- ▶ Low Loss and Cost Thin Film Ferroelectrics for Frequency Adaptive Electronics, DOD/ DARPA
- ▶ Ultra Thin Magnet Wire Insulation Coatings for Higher Fields, DOE
- ▶ Embedded Capacitors for Multichip Modules and Printed Circuit Boards and Thermal Management Films for Power Electronic Building Blocks, DOD/ Navy
- ▶ S-Band Ferroelectric Phase Shifter, DOD/ Air Force
- ▶ Micro Testing System for Thermal-Mechanical Properties and Interfacial Strength of Micron Plus Scale Components in Infrared Devices, DOD/ Army
- ▶ A Novel Approach to the Fabrication of Polymer-based EO Devices and Subsystems-On-A-Chip, DOD/ Air Force
- ▶ Crystalline Ferroelectrics Combined with Transistor Technology, NSF
- ▶ Controllable Atomization for Supercritical Combustion, DOD/ Air Force
- ▶ Self-Cleaning Surfaces with Morphology Mimicking Superhydrophobic Biological Surfaces, DOE
- ▶ Engineered Magnetic Nanoparticles for Advanced Biosensor Signal Processing and Detection of Waterborne Pathogens, EPA
- ▶ A Flexible Fuel Reformer, DOD/ Air Force
- ▶ Regenerative Sorbent System Solutions for Logistics Fuels Desulfurization, DOD/ Air Force
- ▶ Development of Advanced Thin-Film Microwave Filter, DOD/Navy

CUSTOMERS AND MARKETS

- ▶ DOD
- ▶ DOE
- ▶ EPA
- ▶ NIH
- ▶ NSF
- ▶ Rohm & Hass
- ▶ Raytheon
- ▶ Northrop Grumman
- ▶ Sigma-Aldrich
- ▶ Milmega (UK)
- ▶ Numerous confidential companies

COMPANY PROFILE

Brief history

nGimat was formed in 1994 and initially received funding from SBIR awards. In 1998, nGimat won the Tibbetts Award for exceptional commercialization of SBIR-funded work. In July 2000, nGimat moved into a newly refurbished office and R&D facility and currently occupies about 70,000 ft².

Since its inception, nGimat has demonstrated an ability to develop customer relationships and to effectively use SBIR/STTR funding. nGimat's past and present SBIR/STTR Phase II projects have involved collaboration and co-sponsorship by military contractors and commercial industry partners. One example of nGimat's transition to commercialization is developing advanced materials for electronic applications. Based on technical success in its first Phase II BMDO SBIR project, and additional effort from a Navy STTR project, nGimat negotiated a development partnership with the Electronics and Materials division of Rohm & Haas, a Fortune 500 manufacturer. This development resulted in a license agreement with Rohm & Haas utilizing nGimat's technology for embedded resistor product. nGimat has also converted Phase II SBIR technical results into a relationship involving frequency agile devices with Raytheon. The results from a DARPA SBIR laid the foundation for an nGimat development program with a wireless manufacturer. Air Force-, NASA-, and NSF-funded projects, including efforts with Northrop Grumman, led to nGimat's nanopowder production capabilities. In general, nGimat has developed collaborations with over 20 major companies.



Team

nGimat has a group of talented scientists and engineers, who specialize in a wide variety of fields including electrical engineering, materials, physics, and chemistry. The company provides unique and highly advanced R&D services and products to the world's leading companies in a broad range of industries.

Management

ANDREW T. HUNT, PH.D.

Chief Executive Officer,
Chief Technology Officer.

Starting nGimat as a "one man operation" self-funded by credit card purchase, Dr. Hunt has developed commercial relationships with industry-leading companies and research partnerships with key government agencies in nGimat's target markets. Andrew has authored two book chapters for industry publications on vapor deposition, published over 30 scientific papers, and has over 50 patents proposed, pending, or mostly issued. Andrew received his B.S. in Geology from Auburn University, a Masters Degree in Geology from the Colorado School of Mines, and a Ph.D. in Materials Science & Engineering from the Georgia Institute of Technology. He received the SAIC award for best Ph.D. paper at Georgia Tech, based on his doctoral thesis on Combustion Chemical Vapor Deposition. Andrew was selected in 2002 for the National Academy of Engineering's (NAE) Frontiers of Engineering Symposium and the 2005 German-US joint meeting. He has served on a board at the National Academies and on Georgia Tech's External Advisory Board for the school of Materials Science and Engineering (chairman), College of Engineering, and as Trustee of the Alumni Association.

DAVID A. SMITH

Chief Financial Officer

Mr. Smith has experience in a full range of management responsibilities including finance, accounting, strategic planning, information systems, risk management, treasury functions, human resources and legal activities. Dave has served as Chief Financial Officer for three publicly-held companies, including Cobre Mining Company, a Canadian copper producer acquired by Phelps Dodge Corporation in 1998, Santa Fe Pacific Gold Corporation, a \$2 billion precious metals producer that was acquired by Newmont Mining Corporation, and Catellus Development Corporation, a NYSE-listed real estate and development company. Dave has led IPO's and the spin-off/sale of several companies, including Sprint. Dave has a B.S. degree in Business Administration and an MBA from Oregon State University.

Board of Directors

Andrew T. Hunt, Ph.D. - Chairman of the Board. (See above biography.)

Jeffrey C. Moore served as the Chief Operating Officer and in-house counsel of nGimat from the Company's inception until 2001. Mr. Moore joined nGimat after serving as Senior Attorney for Advantis (a Sears/IBM joint venture) and, prior to that, served as Laboratory Counsel for IBM with a focus on formation of strategic third-party alliances. Mr. Moore is presently the VP of Business Operations for Virent Energy Systems, Inc., a biofuels venture-backed startup in Madison, Wisconsin. Jeff earned a B.S. in Business Administration-Accounting from Miami University of Ohio, a Juris Doctor from Ohio State University College of Law, passed the CPA examination, and was admitted to the State Bars of New York and Georgia.

Thomas A. Saponas was until his retirement in 2003, the Senior Vice President and Chief Technology Officer for Agilent Technologies, the 1999 spinoff of Hewlett Packard Company. Mr. Saponas was responsible for establishing Agilent's long-term technology strategy and directly supervised its central research lab. Prior to this, Tom was Vice President and General Manager at Hewlett Packard where he led eight divisions and 5 operations. As a General Manager, he was also responsible for HP's world-wide R&D, marketing and manufacturing of oscilloscopes, logic analyzers and microprocessor development systems as well as having manufacturing responsibility for HP's thin and thick film microcircuits. In the mid-80's, Tom was a White House Fellow (Special Assistant to the Secretary of the Navy) and was awarded the Superior Civil Servant for a major cost saving initiative. He currently is also a director of Procera Networks (PKT) and Keithley Instruments (KEI). Mr. Saponas has a B.S. degree in Computer Science and Electrical Engineering and an M.S. degree in Electrical Engineering from the University of Colorado.



nGIMAT

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