Nanoramic™ LABORATORIES

About

Nanoramic—rebranded from FastCAP in 2018—is an industry-leading energy storage technology and materials solution innovator headquartered in Boston, MA. Based on a deep knowledge of nanocarbon materials, processes, and applications, Nanoramic has demonstrated success in ultracapacitors, polymer-based composites, thermal interface materials, and binderless electrodes for energy storage.

Founded in 2010, under the leadership of co-founder Dr. John Cooley, the team began working under a multimillion-dollar grant from the DOE ARPA-E to develop its novel ultracapacitor technology based on carbon nanotube electrodes. FastCAP was honored again by the DOE Geothermal Technologies Program in 2011 to develop a cutting-edge power system for geothermal energy exploration.

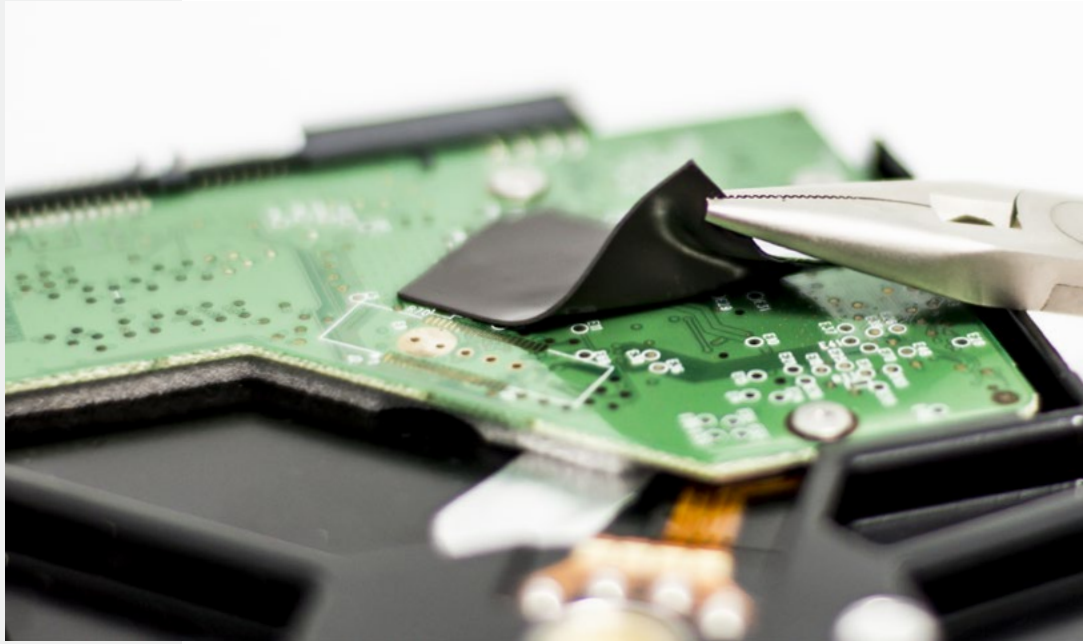
The Nanoramic Laboratories suite of products include the Chip Ultracapacitor, Composite Electrode, High Temperature Ultracapacitors, and Advanced Materials. Under the leadership of CEO Eric Kish, the Nanoramic team is based in the Innovation and Design Building and has a 17,000+ Square Foot Manufacturing facility. The corporation holds 18 granted patents and 75+ pending applications. The FastCAP Ultracapacitor is the only product of its kind capable of operating in conditions up to 150*C with high shock and vibration.

Contents

Advanced Materials

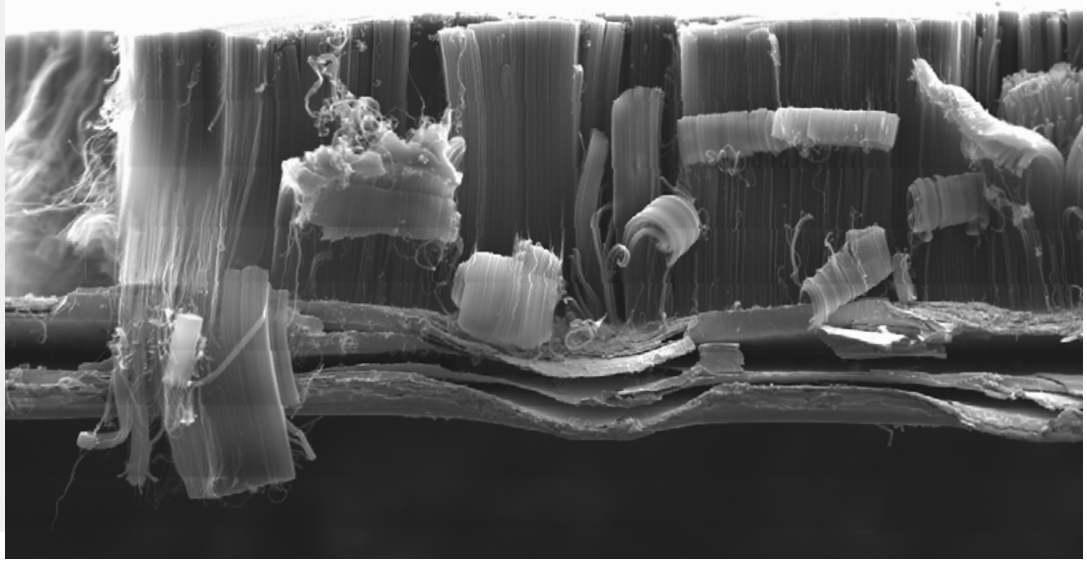
Thermal Interface Materials

Based on Nanoramic's proprietary compounding, dispersion and coating processes, the Nanoramic TIMs provides higher thermal conductivity than any other TIMs on the market while retaining or improving advantageous mechanical properties. Surface properties have been designed for good interfacing to metallic surfaces. The carbon nanotubes that are used as an additive increase the bulk thermal conductivity of the material while adding mechanical strength and durability.



EMI/RFI Shielding Materials—Coming 2019!

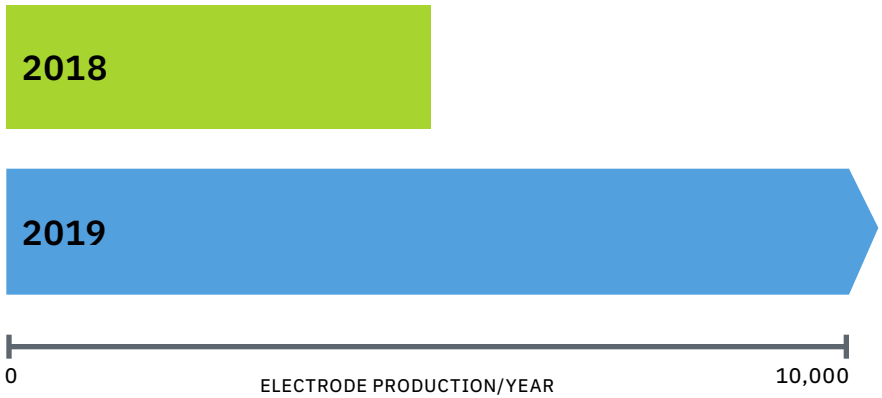
Nanoramic is developing an extrudable, 3D printable and electrically conductive plastic composite for EMI / RFI shielding. Based on Nanoramic's 3D nanocomposite technology, this composite exploits the high electrical conductivity of nanocarbons to enhance commonplace housing and enclosure materials with electrical conductivity for blocking or attenuating electric and magnetodynamic fields.

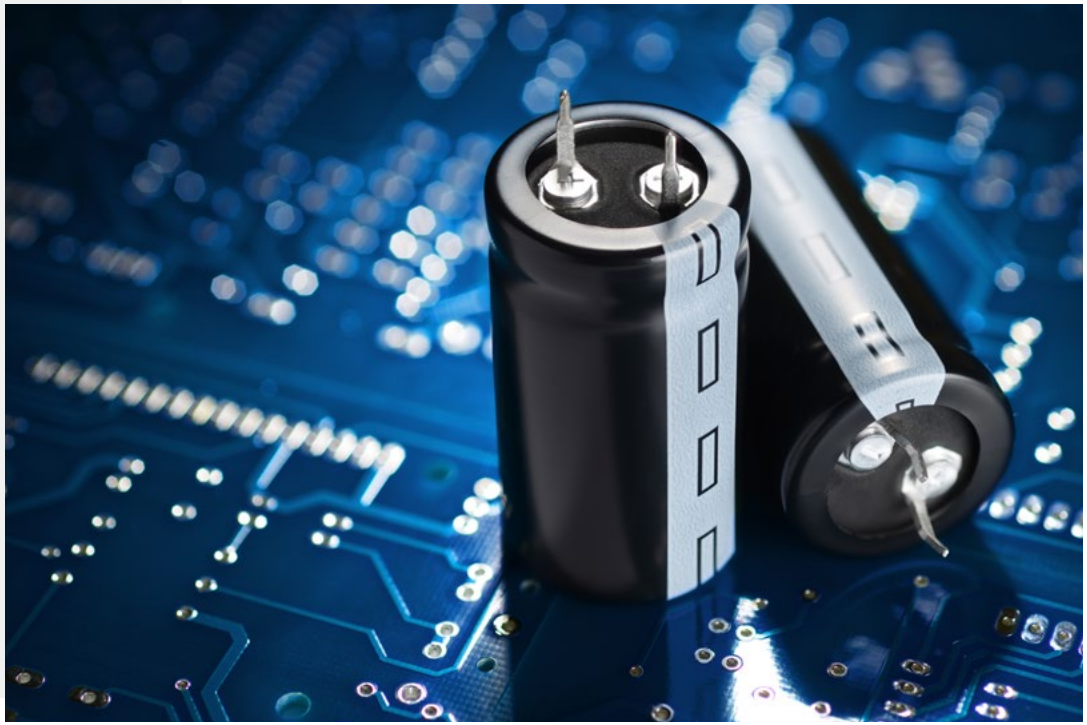


Composite Electrode

The Composite Electrode is a carbon electrode specifically designed to operate at higher voltages and temperatures. It is based on Nanoramic's proprietary 3D nanocomposite technology that provides enhancements in electrochemical stability along with very low ESR. The Composite Electrode is intended to replace ultracapacitor electrodes in standard electrolyte systems in order to increase the operating voltage or temperature of the device. Coupled with Nanoramic's high performance electrolytes, the Composite Electrode voltage and temperature performance can be enhanced further.

COMPOSITE ELECTRODE ANNUAL PRODUCTION

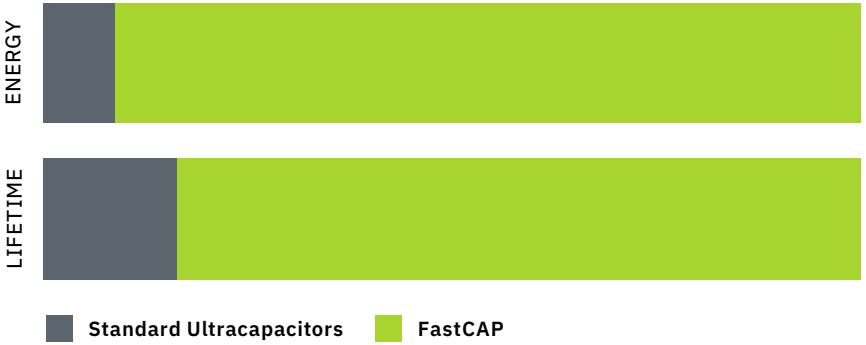




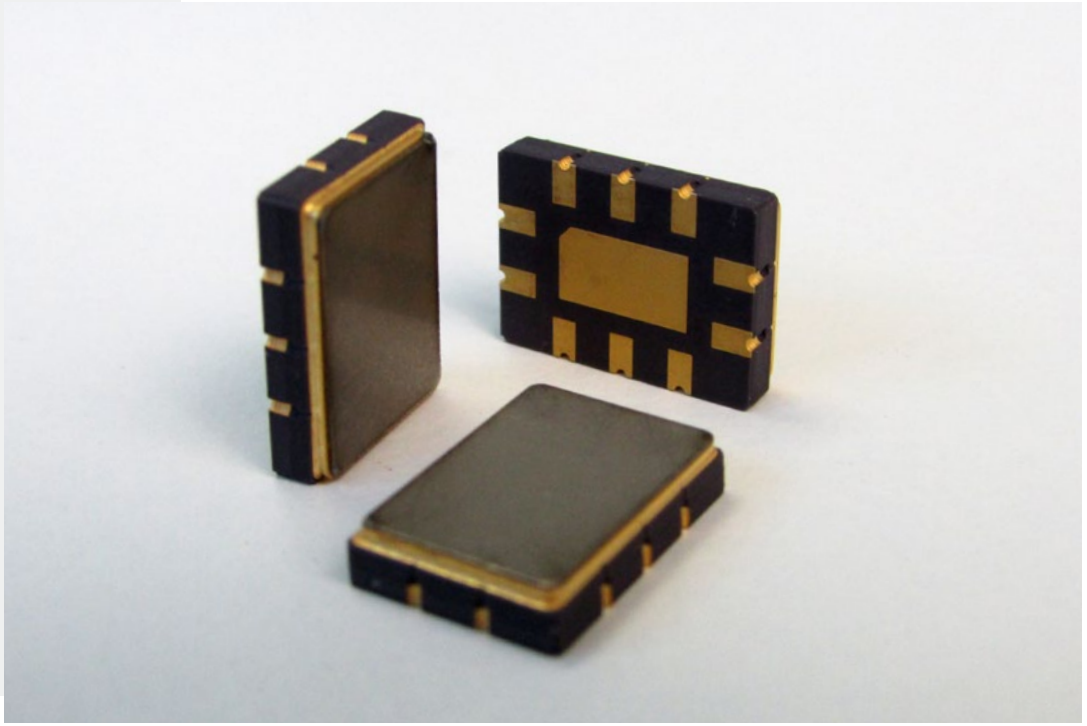
FastCAP Chip Ultracapacitor

Launched in 2017, the FastCap Chip Ultracapacitor is a reflowable, slim profile, low-ESR ultracapacitor which provides power loss protection in SSD and IOT technologies. After 10 years of development and research, Nanoramic's Ultracapacitor has ten times more energy per unit of volume and five times longer lifetime than incumbent technologies such as tantalum capacitors. While tantalum capacitors are the standard solution for hard drive energy storage, Nanoramic is leading the way with the only ultracapacitor capable of withstanding the reflow process on the market.

Using only two (2) of these tiny, thin profile, reflowable and board-mountable ultracapacitors can replace up to 30 tantalum capacitors, while providing an even longer power loss protection time. The space saved by removing multiple tantalum capacitors can be utilized to add additional memory chips on each board, reaching up to 10 times the storage available.



2 FastCap ultracapacitors can replace up to 30 tantalum capacitors



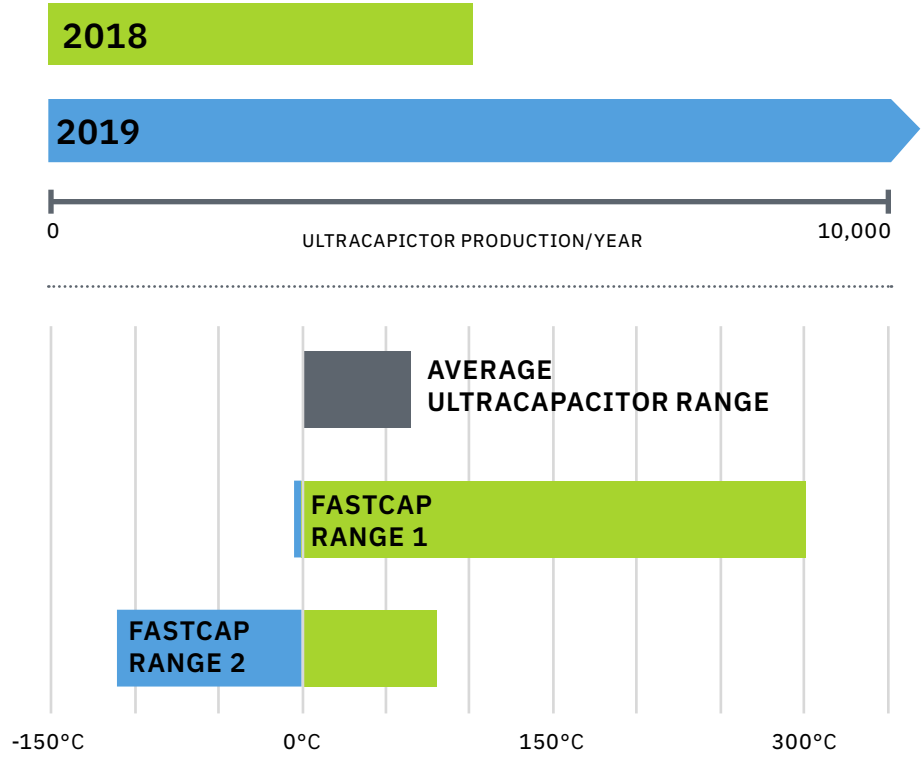
Specific Applications:

- SOLID-STATE DRIVE (SSD)
- SMART METERS
- MEDICAL DEVICES
- WEARABLE DEVICES
- PROGRAMMABLE LOGIC CONTROLLER (PLC)
- ELECTRONIC PAPER
- ELECTRIC TEST EQUIPMENT
- POWER ASSIST FOR LITHIUM THIONYL CHLORIDE BATTERY
- POWER ASSIST FOR COIN CELL BATTERY
- FIRE ALARM SYSTEMS
- AUDIO APPLICATIONS

FastCAP High Temperature Ultracapacitor

The FastCAP High Temperature Ultracapacitor is the only product of its type capable of operating under extreme environments required by in the energy exploration industry. Nanoramic's Ultracapacitor allow users to eliminate lithium thionyl chloride batteries downhole, allowing organizations to remove hazardous material shipping expenses and eliminating the risk of using a dangerous product.

Developed for downhole operations in Oil and Gas drilling, the EE Series was engineered to operate in the extreme environments (100°C, 125°C, 150°C) common to the energy exploration industry. Nanoramic's FastCAP ultracapacitors are the only hermetically sealed ultracapacitors capable of high temperature (>125°C) and low temperature (< -55°C) operation. Nanoramic's technology has been validated from -110°C to 250°C by Sandia National Laboratory.



Bios

Eric Kish *CEO*

Eric joined Nanoramic as CEO in 2017, bringing more than two decades of experience as a CEO. His leadership, dedication, and tactical approach has supported 12 organizations in five industries across three continents scale and course-correct financial and operational challenges.

At Nanoramic, Eric has focused on agile processes and systems that empower all team members, nurturing a culture that allows quick decision making that aligns with the company's visions and goals.

Eric is also an author and a speaker, specializing in Businesses Execution Education. He authored 2 books, Everyday Turnaround—The Art and Science of Daily Business Transformation and 5 to 50 to 500—How to build and run scalable organizations and he is a regular speaker for Vistage—the world's leading business advisory and executive coaching organization.

Following his service in the Israeli Armored Corps and work in the Israeli Defense Industry, Eric obtained an M.Sc. in Business from Stanford Business School, an Advanced Certificate in Strategy and Innovation from MIT Sloan School of Management, an Executive Certificate in Industrial Administration from Tepper School of Business, Carnegie Mellon University and an M. Sc. in Electrical Engineering from the Polytechnics of Bucharest with a major in Power Electronics.

Eric is fluent in 6 languages. He is also a leading member of the US Association of Interim Executives.

John Cooley *Co-Founder and COO*

Dr. Cooley co-founded Nanoramic in 2009, where he currently serves as President and Chief Operations Officer and focuses on technology development and commercialization.

In the past, he has worked in the defense and medical device industries and has consulted in IP litigation. At Nanoramic, John has led the execution of our first product lines and has co-authored multiple winning grant proposals.

Dr. Cooley has been issued several patents including four (4) for his thesis work. He has presented and published papers in the areas of power converter control and modeling, linearized circuit analysis, capacitive sensing, building energy management, and in education.

Journal publication venues include the IEEE Transactions on Power Electronics, IEEE Transactions on Industrial Electronics, IET Transactions on Circuits, Devices and Systems, and the Journal of Solid-state Circuits. John's interests lie in energy-related problems of scale and the ways in which we can impact those with technology and policy. John is a member of the IEEE and Sigma Xi.

Dr. Cooley holds five (5) technical degrees from MIT including the Ph.D. from the Electrical Engineering dept. At MIT, he won both the David Adler Memorial Thesis Prize and the Morris Joseph Levin Award for his thesis work, and was a Martin Family Fellow in 2009.

Bios

Nicolo Brambolò *CTO*

In 2010 he joined Nanoramic after working at Thales Avionics as a control engineer and MEMS engineer for aircraft avionics.

At Nanoramic, he led a team of engineers who developed the first-of-its-kind high temperature carbon nanotube ultracapacitor, that was successfully tested at Sandia National Labs. In 2013, his team successfully completed an ARPA-E program, meeting or exceeding all technical goals and developing a unique carbon based electrode with significant performance improvements over competitors. The resulting technology was validated at the NAVSEA Crane Laboratories and set world records for the highest energy density, the highest power density, and the highest frequency ultracapacitor, among others. Nicolo was Principal Investigator of NASA programs for the development of energy storage for extreme environments; he was also the Principal Investigator of a DoD program for high performance and long lifetime energy storage. He is lead author on numerous patents covering nano-materials for energy storage electrodes, electrolytes, and energy storage cells and modules.

Nicolo is currently leading the teams developing Nanoramic's new products, including the chip ultracapacitor, binder-free composite electrodes, and thermal interface materials.

Nicolo holds an M.Sc. in Electrical Engineering and an M.Sc. in Micro and Nantotechnologies from the École Supérieure d'Électricité, and an M.Sc. in Physics Engineering from Politecnico di Milano.

Julie Ross *CFO*

Julie joined Nanoramic in 2017 has been the financial lead in closing three rounds of investments. The first, a $4 million convertible note round still has $1 million available, the next is a $600 thousand Pref C round. The latest, a $5 million investment, closed in September 2018, allowing the introduction of the UltraChip into the Asian market.

She is focused on growing Nanoramic's financial processes to scale the company and raising capital to bring new innovations to market.

Julie began her career at Price Waterhouse Coopers in the Wealth Management Tax Group. While at PwC, she completed her rotation in the Audit and assurance service group then obtained her Certified Professional Accountant (CPA) designation. Julie has worked with numerous early-stage companies in industries such as bio-tech, financial services, health & wellness, service & consulting and more. She has worked with top level executives on strategic planning and implementation as well as implementing strong financial systems controls.

Julie hold a B.S in Accounting from Bentley University. She is a member of the AICPA and holds a CPA designation with the MA Board of Public Accountancy. Julie was a recipient of the South Shore Stars 40 under 40 award for her commitment and leadership in the community.

Bios

Matt Fenselau *General Counsel, VP of Technology Licensing*

Matt joined Nanoramic in September 2014 and serves as VP of Technology Licensing. He joined the company after a decade in large law firm practice, where he specialized in intellectual property transactions, patent strategy and portfolio development, and emerging technologies.

Matt leads the IP strategy and patent management. Through invention disclosure harvesting and patent landscape analysis, Matt was able to grow the patent portfolio from 1 to 15 granted patents, and maintains an international patent portfolio with more than 30 active patent families. He has successfully supported and lead two preferred stock investment rounds and two major strategic investments by key technology partners.

He holds a J.D. from Boston College Law School, an M.S. and an M.Phil. in Physics from Yale University, and a B.A. in Physics and Mathematics from Franklin & Marshall College. Matt is a member of the Association of Corporate Counsel, Boston Patent Law Association, and American Physical Society.

Christopher Deane *Vice President, Manufacturing*

With Nanoramic since 2010, Chris leads the Manufacturing department. By instituting Six Sigma, 5S and Lean Manufacturing principles the manufacturing department will be able to build a variety of products and samples for customers with high quality and precision. Utilizing the skills of in-house technicians, automation, cloud apps, contract manufacturers, and specialized equipment will allow for constant innovation and will continue to improve the design iteration cycle, quality and product performance.

Christopher developed the high temperature ultracapacitor technology from a lab prototype into a scalable product line including a variety of sizes and models. He is the author of several granted patents in Energy Storage Devices and Systems and is an expert in energy storage assembly, methods, and design for manufacturing. He now focuses on bringing design ideas to fruition and working closely with customers to bring innovative and new product ideas and concepts to production.

Christopher graduated from Boston University with a degree in Mechanical Engineering.

Katie Willgoos *Vice President, Marketing*

Katie joined Nanoramic in 2013 and currently holds the title Vice President of Marketing.

She gained experience in fields such as revenue management, event planning, sales, and human resources. In addition to overseeing tactical execution of all marketing and branding activities for Nanoramic Laboratories and FastCAP Ultracapacitors, she manages recruiting and onboarding processes for the company.

Katie holds a B.S. in Communications with a concentration in Public Relations from Boston University. She is currently pursuing a Certificate in Marketing Management from Harvard University.

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TEAM MEMBERS

SUPPORTING FOUR DIFFERENT PRODUCT LINES

"Nanoramic's core ultracapacitor technology enables energy storage in environments where other energy storage devices are inoperable. Our newest advancements, the chip ultracap and thermal interface materials will disrupt large markets."

-Katie Willgoos, VP of Marketing

MADE IN AMERICA

"We have a culture that supports technical innovation as well as personal well-being. This a great team to be a part of. Every day is very exciting."

-Dr. John Cooley, Co-Founder and COO

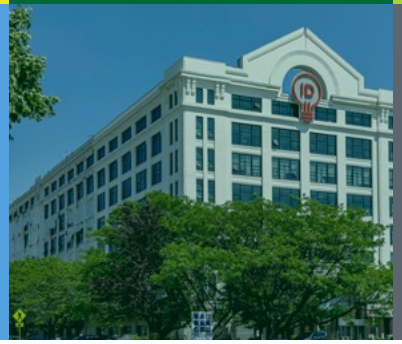
FOUNDED IN 2010

A GLOBAL CORPORATION WITH TEAM MEMBERS IN 6 COUNTRIES

18 GRANTED PATENTS
75+ PENDING APPLICATIONS

"Our team has proven their skills at innovating and problem solving—as our partners look for resolutions to technical issues we can work together to find solutions."

-Julie Ross, CFO



17,375 SQUARE FEET MANUFACTURING AND OFFICE FACILITY SPACE

White Papers and Press Releases

Nanoramic Labs' FastCAP SD85-500 Chip Ultracapacitor for Backup Power in Solid State Drives

Nanoramic's FastCAP SD85-500 Chip Ultracapcacitor is the first reflowable, slim profile, and low ESR device that fits energy storage requirements for power loss protection in SSDs. In this article, we outline the benefits of she SD85-500 product vs. tantalum polymer capacitors and other surface mounted ultracapacitors. In addition, case studies are discussed and examples of configurations are presented.

https://go.nanoramic.com/chip-cap-for-backup-power-in-ssd

The Lithium-free Toolstring

In this paper, we'll introduce Nanoramic's FastCAP Ultracapcitors as a solution for generator energy buffering and bus stabilization. Measurement While Drilling (MWD) and Logging While Drilling (LWD) operations often require constant power to sustain sensors, communication links, and downhole tools for best accuracy and speed. Mud turbine generators are a common source of downhole power. They provide electric power by steering mud flow through a turbine assembly which in turn generates electricity. AC/DC power converters regulate the power bus for delivery to the downhole instruments. However, drilling operations frequently require mud flow to be turned off, disabling the downhole turbine from generating electricity, leaving power bus without a primary source. For this reason, Lithium-thionyl chloride (Li-SOCl2) batteries are often used in conjunction with a downhole turbine in order to regulate the power bus during those times when mud flow is off. As an alternative solution, Nanoramic Labs is currently offering high temperature ultracapacitors suitable for downhole energy storage and battery replacement. Nanoramic's FastCAP Ultracapacitors are rechargeable, high power devices that are safe to operate and contain no hazardous materials.

https://go.nanoramic.com/l/370661/2017-06-25/27nb

Structural Ultracapacitor Energy Storage

The concept of structural energy storage seeks to synergistically combine the mechanical, load-bearing qualities of chassis infrastructures with the electrical, power-delivering capabilities of contemporary energy storage solutions. Capacitor sizes and shapes are tailored for space constrained and unusual shapes where conventional cylindrical or prismatic solutions are difficult to integrate. Applications target either a reduction in system size or an augmentation in system power and energy. Strong candidates for this technology include:

- Satellites (CubeSats, NanoSats)
- Unmanned Aerial Vehicles (UAVs)
- Robotic Platforms
- Cargo Modules
- Micro-sensors
- Missile Systems
- Underwater Vehicles
- Light Military Vehicles
- Electric Vehicles
- Electric Motorcycles, Scooters
- Motor Housings
- Integrated Renewable Storage
- Race Cars and Motorcycles
- Small Consumer Electronics
- Battery Chargers
- Hybrid Battery Systems

https://go.nanoramic.com/structural_ultracapacitor

FastCAP launches newest product—a Chip Ultracapacitor

FastCAP systems rebrands to Nanoramic Laboratories

NGK SPARK PLUG CO., LTD. Leads Investment Rounds in FastCAP Systems

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