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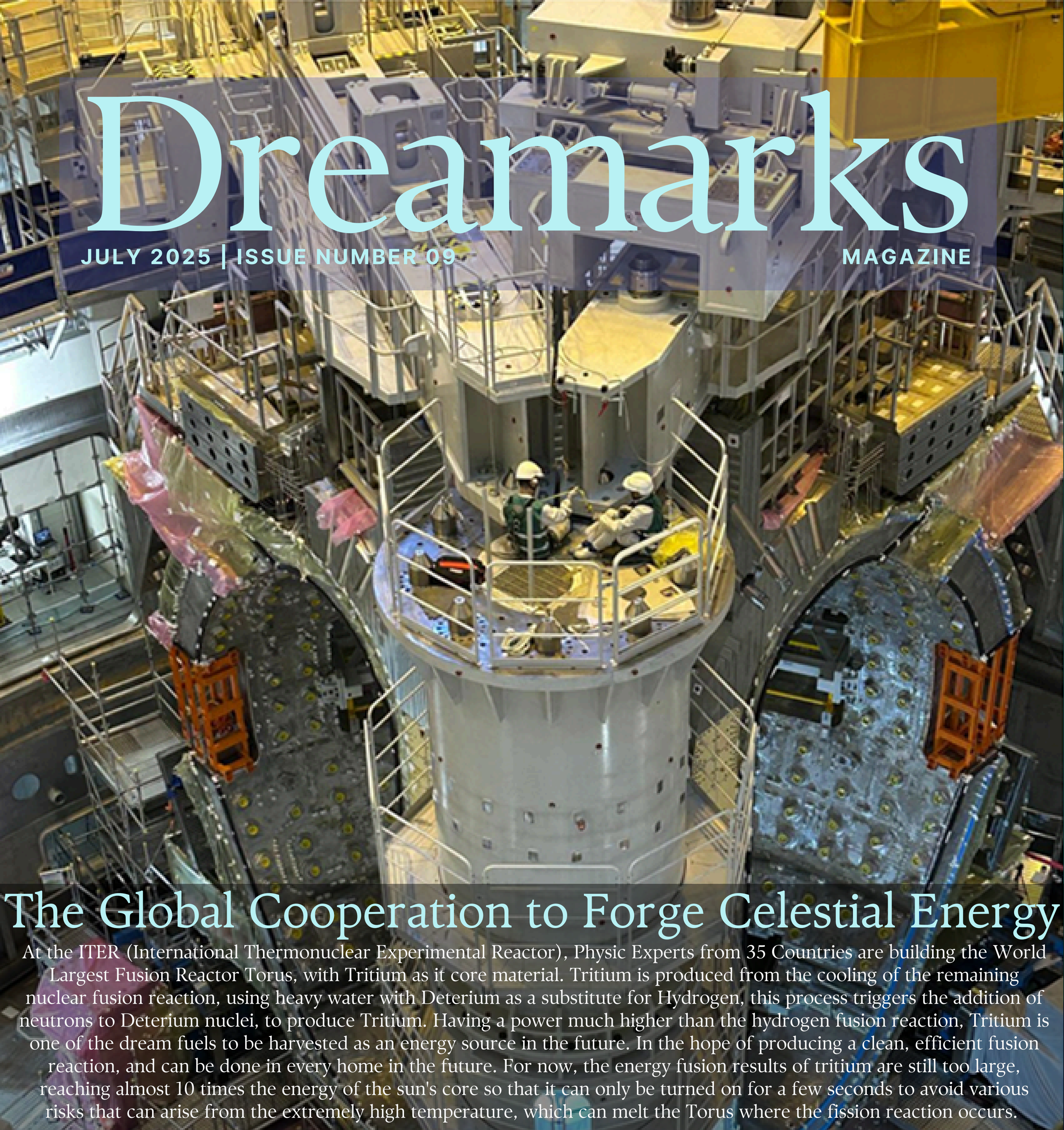
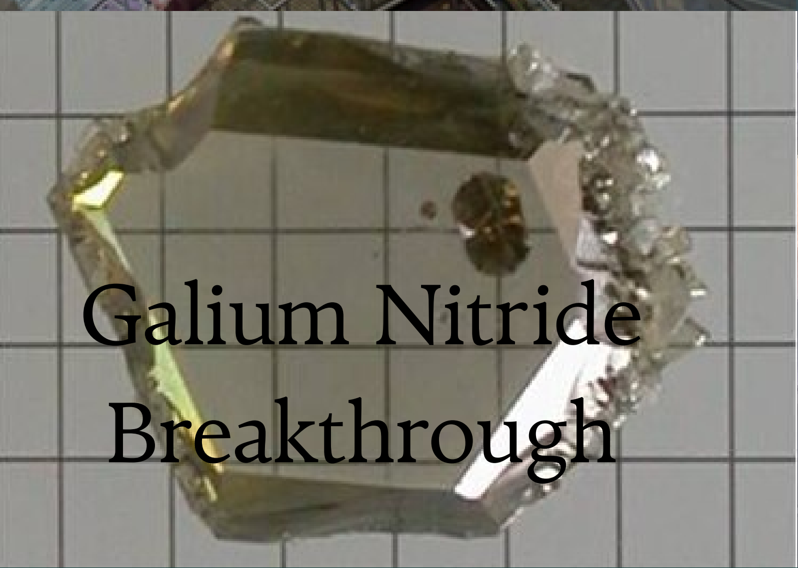
MAGAZINE



The Global Cooperation to Forge Celestial Energy

At the ITER (International Thermonuclear Experimental Reactor), Physic Experts from 35 Countries are building the World Largest Fusion Reactor Torus, with Tritium as it core material. Tritium is produced from the cooling of the remaining nuclear fusion reaction, using heavy water with Deterium as a substitute for Hydrogen, this process triggers the addition of neutrons to Deterium nuclei, to produce Tritium. Having a power much higher than the hydrogen fusion reaction, Tritium is one of the dream fuels to be harvested as an energy source in the future. In the hope of producing a clean, efficient fusion reaction, and can be done in every home in the future. For now, the energy fusion results of tritium are still too large, reaching almost 10 times the energy of the sun's core so that it can only be turned on for a few seconds to avoid various risks that can arise from the extremely high temperature, which can melt the Torus where the fission reaction occurs.



Galium Nitride Breakthrough

Extreme Ultra Violet Technology

IN THIS ISSUE

Dreamarks Magazine

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Unlocking The Multi Modality Variables

We present to you this 9th Edition of Dreamarks Magazine by Unraveling The Unlimited Multi Modalities Forging the Celestial Power House, with the joint cooperations of the Earth largest Energy Technology Centers. China, European Union, Canada, Australia, United States, are among the Nations that are supporting this planet effort to create clean, fast, and cheap energy of the future, from the most abundant particles in the universe; Hydrogen, that then developed to produce Deterium and Tritium.

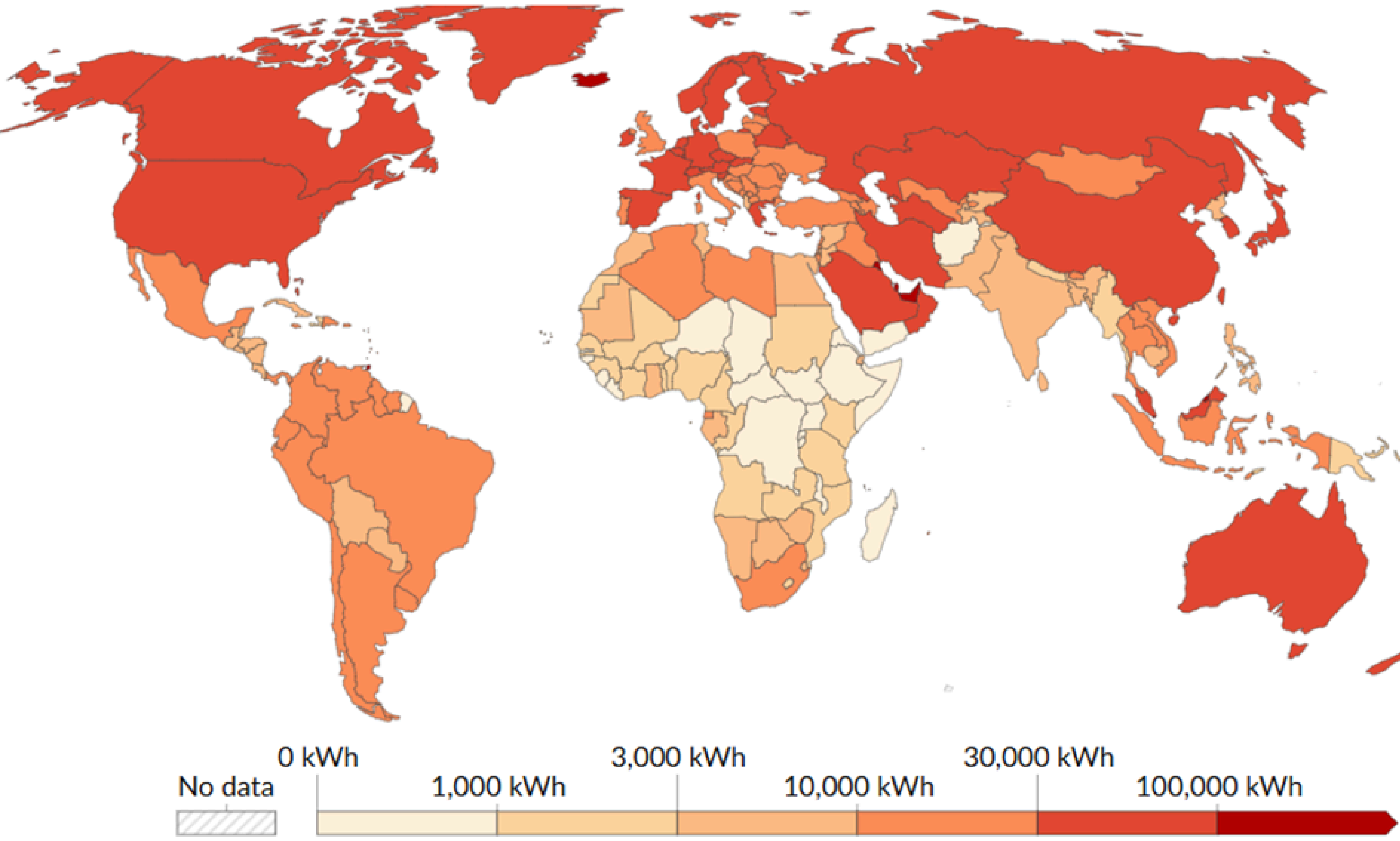
On The Field of Nano Materials Technology, we are examining the possibilities of the usage of Graphene for Semi Conductor Manufacturing, The Use of Gallium Nitride ability to cut one third of Electrical Car Charging time, and How its ability compared to Silicon Carbide.

The Various Applications of Very Low Frequency Wavelength usage in The Exploration of Oil & Gas Field or other Geological Materials Mining, Environmental Health, and Military Field are also in our monitoring.

Let’s not forget to keep Enliven Our Dreams on Various Endless Possibilities for The Advancement of Our Future Planet Earth’s Longevity with various inventions such as Extreme Ultra Violet Technology in the Field of Microchip Development.

Gina Al Ilmi

Editor-in-Chief



Global Energy spent per person in Kilowatt Hours

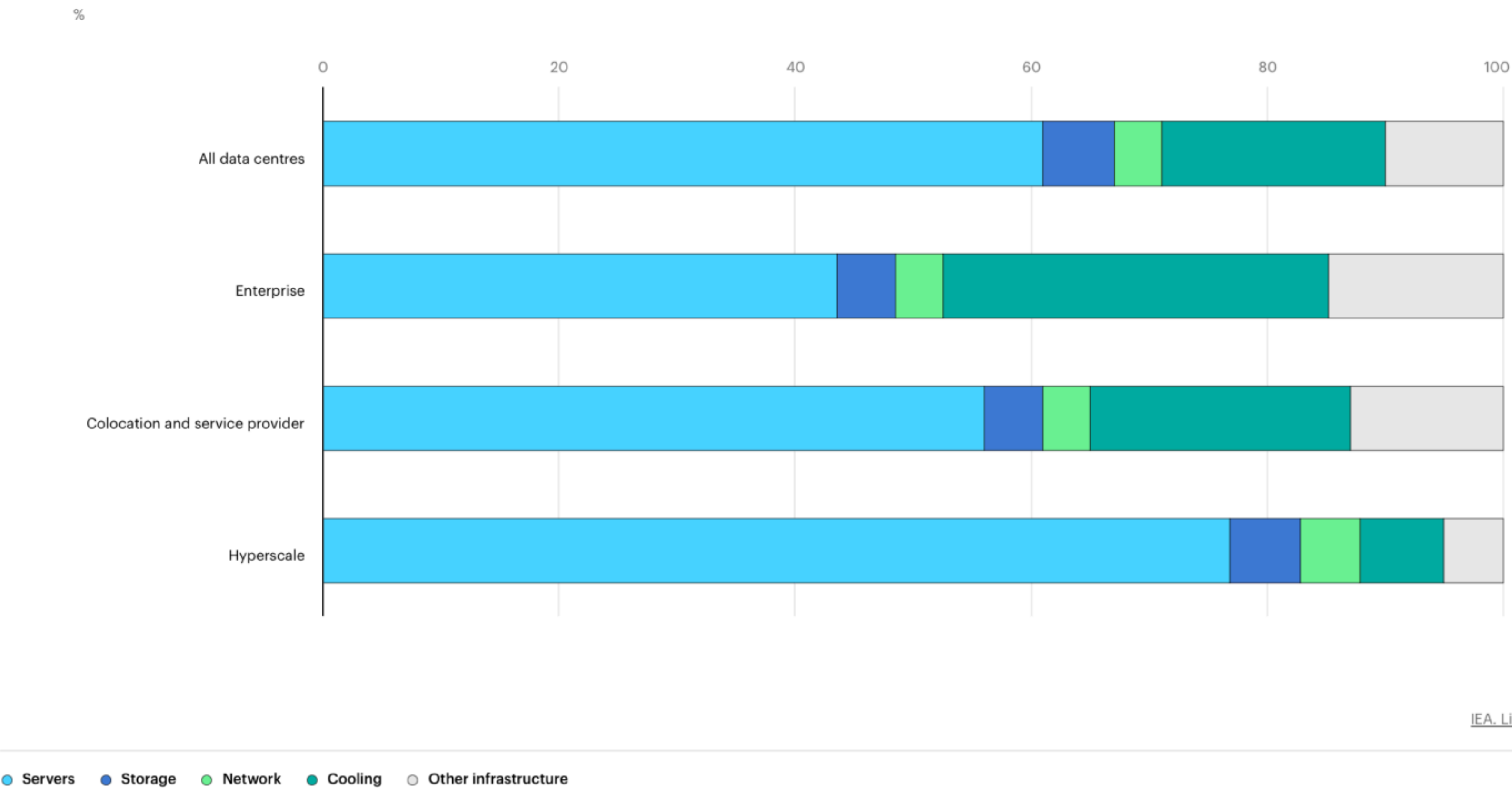
At Office or at Home, we're spending Energy more than ever. From only using TV and AC, to now using the internet, Electronic Vehicle, and allmost all Electronic appliances spending for per hours. When the need of Internet meeting and online working are rising because of the Covid pandemic, the energy markets began to tighten since 2021.
But what has been more concerning is, Ukraine, who has one of the largest Electrical production in the Europe then being invaded by the Russia in February 2022. This makes the price of natural gas reaching its peak and so did another energy source that can powered houses and offices. This conditions are worsen because the world oil price has been high since 2018.

Because of this high energy prices, then comes high inflations. What will happens next if we dont do anything to prepare for this coming winter? Europe, whose gas supply is dependent to Russia, could face gas crisis this winter, if no steps of hindrance being done to prevent it before happening.

Many experts then compare today's electricity crisis with the oil shocks in the 1970s. But back then, economy are less dependent than gas, that difference with current energy source crisis nowadays whom has linkages almost every country in Europe with makes this truly as the first global energy crisis.

Not only because of the shortage of energy source, but also because the energy prices has went too high. Many household in developing countries then unable to provide them self and has to have their power supplies to be cut. This increase extreme poverty if doesnt handled properly.

This should be something that can be predicted sooner. Each countries in the European and Russia must have to create Energy Contingency Plan to ensure they have enough electrical source and energy supply to provide the world with clean energy sources and clean technologies. Not just because of the Climate crisis, but because of this open global energy crisis that we have in front of our eye, right now.



How The Electronics Draining The Energy World Wide; The Data Centers, Servers, AI Infrastructures

If we calculate how many watt we used in an hour, not many person knew that the equations will be very large, complex and intricate. Concerning from the simple things such as the microsoft we use, how many data center they have, how big their data lake capacity, and not to mentions, we will still have to count about how many active gadgets we are using at one moment in the office or at our home office.

Also we will have to count about The wattage of our Air Conditioner, the running power to preserve our food at the refrigerator, how many active lamp we are lighting at our active working hours. Now can you understand why is this current technology development are draining more and more to the current energy power house that are still using carbon based materials?

Thus the race for the great energy power house than has been launched since the era of Ronald Reagan and Michael Gorbachev that has ended the coldwars and they then starting to build nuclear to become energy powerhouse, and not to developed as weaponries.

Do you know that to ensure one app can be running in your phone, there's many of several thousands of people that are working in simultaneous shifts in many related technology corporations? All of the several thousand people are handling each parts of large electric machineries.

All from the Data Center Power house, to the microchip foundry corporations, to the world wide web fiber optics corporations, and the people who are working in the app on one company that you are using. Frequently, a person uses several app at once, and then makes the electrical usage of the necessaries on the electronic to be turn up at the same time. Now that's explain how the electrical draining are becoming inevitable. What we should do next is to built more advance Energy Power House, to make sure human technological race can be serve by the energy race that are at development.

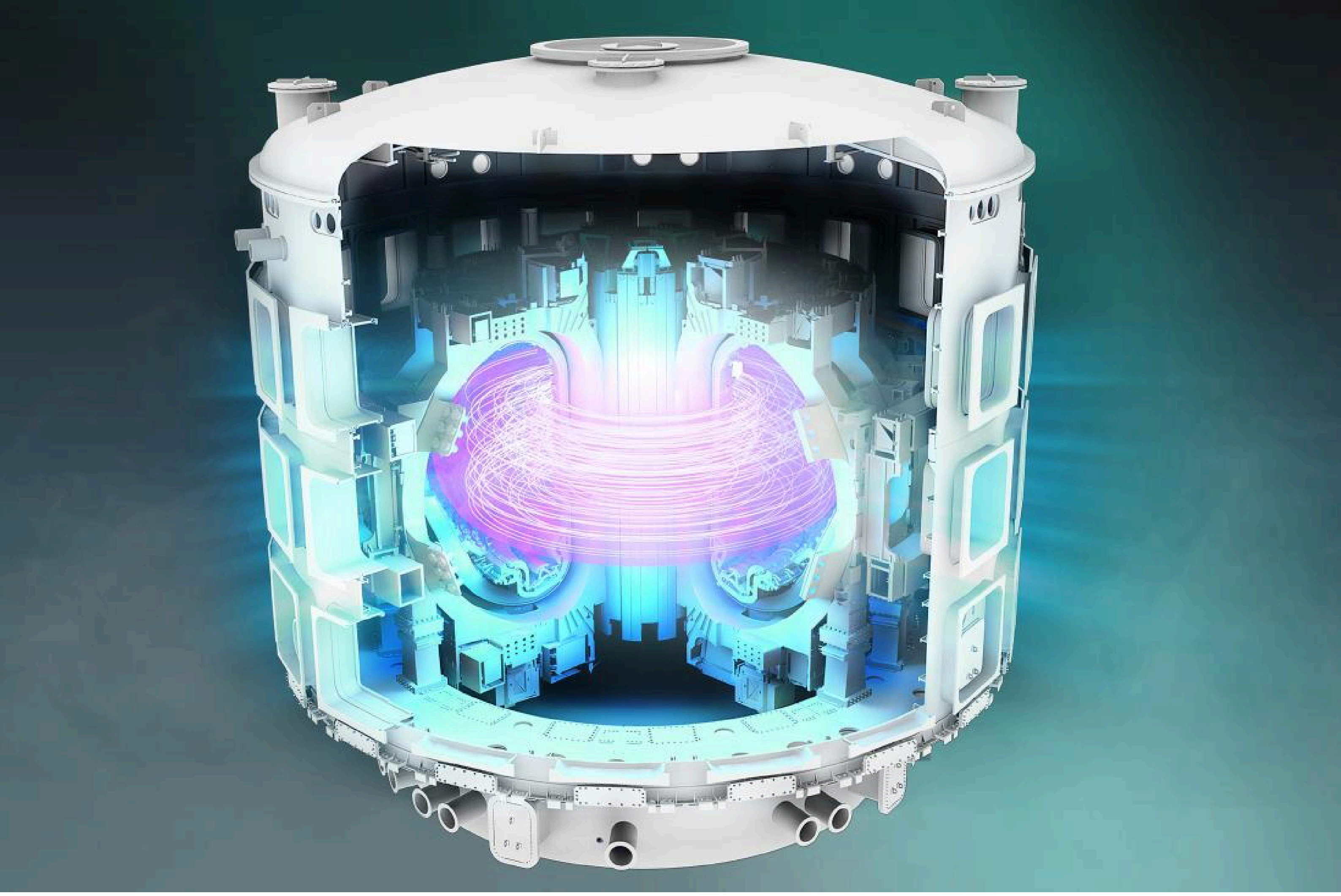
ITER Tokamak, The Largest, Clean & Safe Fusion Reactors for the Future

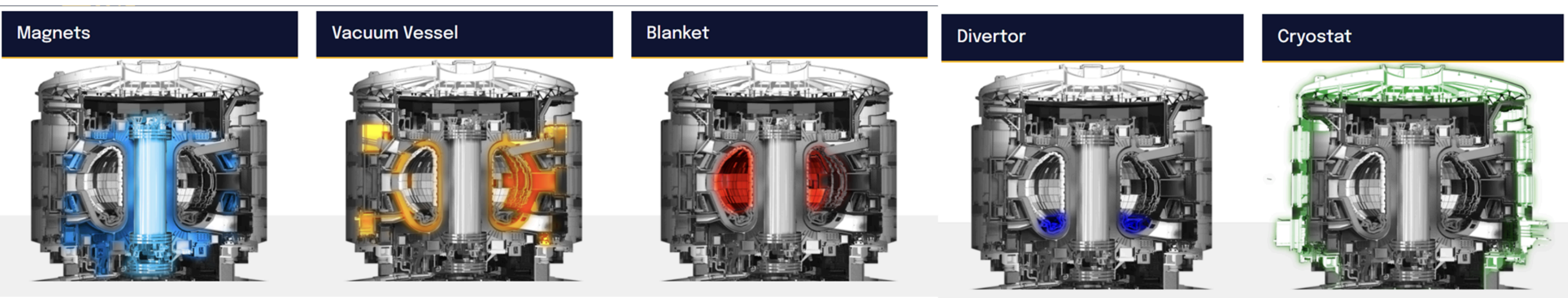
ITER is a joint project of 35 nations collaborating to build the world's largest tokamak, a magnetic fusion device designed to prove the feasibility of fusion reactions as a large-scale and carbon-free energy source based on the same principle that powers our sun and stars. The goal of ITER is to operate at 500 MW (for at least 400 seconds continuously) with 50 MW of plasma heating power input. Until today, only the China Republic that has been able to create what they called as The Second Sun, for 14 seconds. The large fire energy that was forged that day were able to melt down the entire reactor and creating great fire. That's why it was immediately cooled down by the Tokamak Torus ability of Cryostat phase.

ITER (initially the International Thermonuclear Experimental Reactor, iter meaning "the way" or "the path" in Latin) is an international nuclear fusion research and engineering megaproject aimed at creating energy through a fusion process similar to that of the Sun. It is being built next to the Cadarache facility in southern France.

The $28 billion fusion reactor in France, has finally had its last magnetic coil installed. But the reactor itself won't fire up fully until 2039 at the earliest.Its basic function is to operate as the chamber that will host the fusion reaction. Within this torus-shaped vessel, plasma particles collide and release energy without touching any of its walls.

The first of five vacuum vessel sectors for ITER was completed September 2024. ITER stated that once assembled, this sector will measure an impressive 19.4 meters in diameter by 11.4 meters in height, weighing approximately 5,200 tons. ITER claims that in a tokamak device, the larger the vacuum chamber volume, the easier it is to confine the plasma and achieve the type of high-energy regime that will produce significant fusion power.

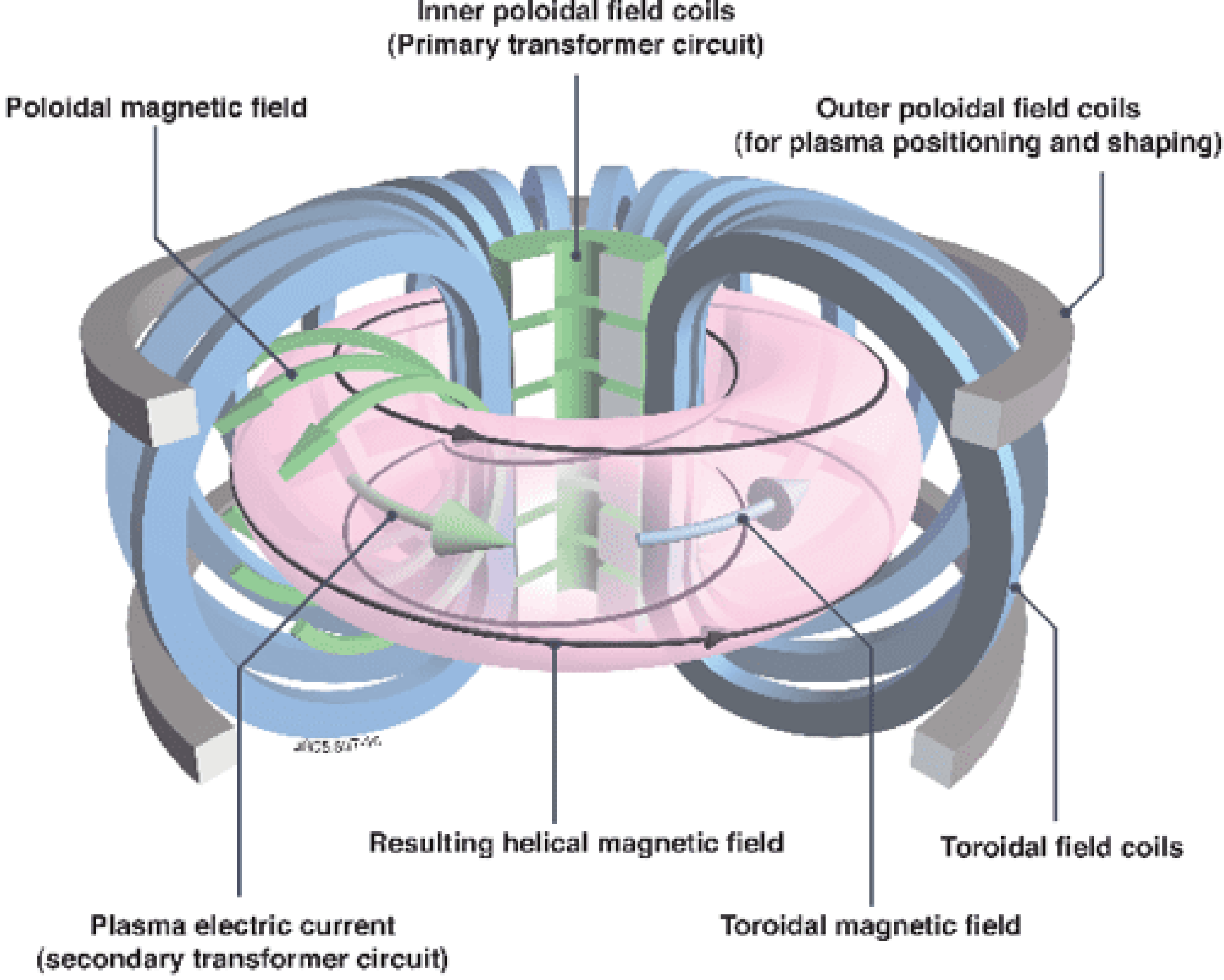




All power plants rely on the power of steam from boiling hydrogen to drive a turbine generator system, which then supplies electricity to a network of electrical cables and antennas, ultimately delivering it to consumers in a safe form.

However, what makes ITER (International Thermonuclear Experimental Reactor) more successful than JET's Tokamak is that it has twice the magnetic power and a plasma energy development chamber 10 times larger. However, ITER is not yet operational; its results are still at a research level, and it will not be fully operational until 2036.

The ITER Tokamak works in five steps: the first is triggering a thermonuclear fusion reaction inside a vanadium-coated torus. Tritium is the primary fuel fuel for this powerful reaction, and it was also an accidental result when plasma energy began to be generated in the Vacuum Vessel period. Next, in the Blanket phase, this very high plasma energy begins to function to rotate the turbine so that it can then produce very high electrical energy that can be distributed to residential areas or industrial areas or data centers. After the Divertor phase is complete, the coolant in the Cryostat Phase in the form of deterium is converted from deterium, and produces Tritium, a material to produce the next high-level electrical energy reaction, so that the Torus Tokamak's ability to produce this energy is sustainable, continues to be sustainable, and always continues to develop.



Measuring the Movement Dynamics in The Fusion Reactor by Using Vertical Stabilization System Coils.

Quarks is the Sub-Atomic building block of everything on this planet and at our whole universe. Quarks can move dynamically and are being bind to other quarks by the Gluon. Resulting physical particles that can change their forms, shapes and developed to create other type of particles by using chemical reactions.

As we have learnt about Quarks and Gluon Particle (QGP), we thus understand that the movement of the Quarks are dynamics and never stops. Although being glued to one other particles to formed and atom of Proton, Electron or Neutron.

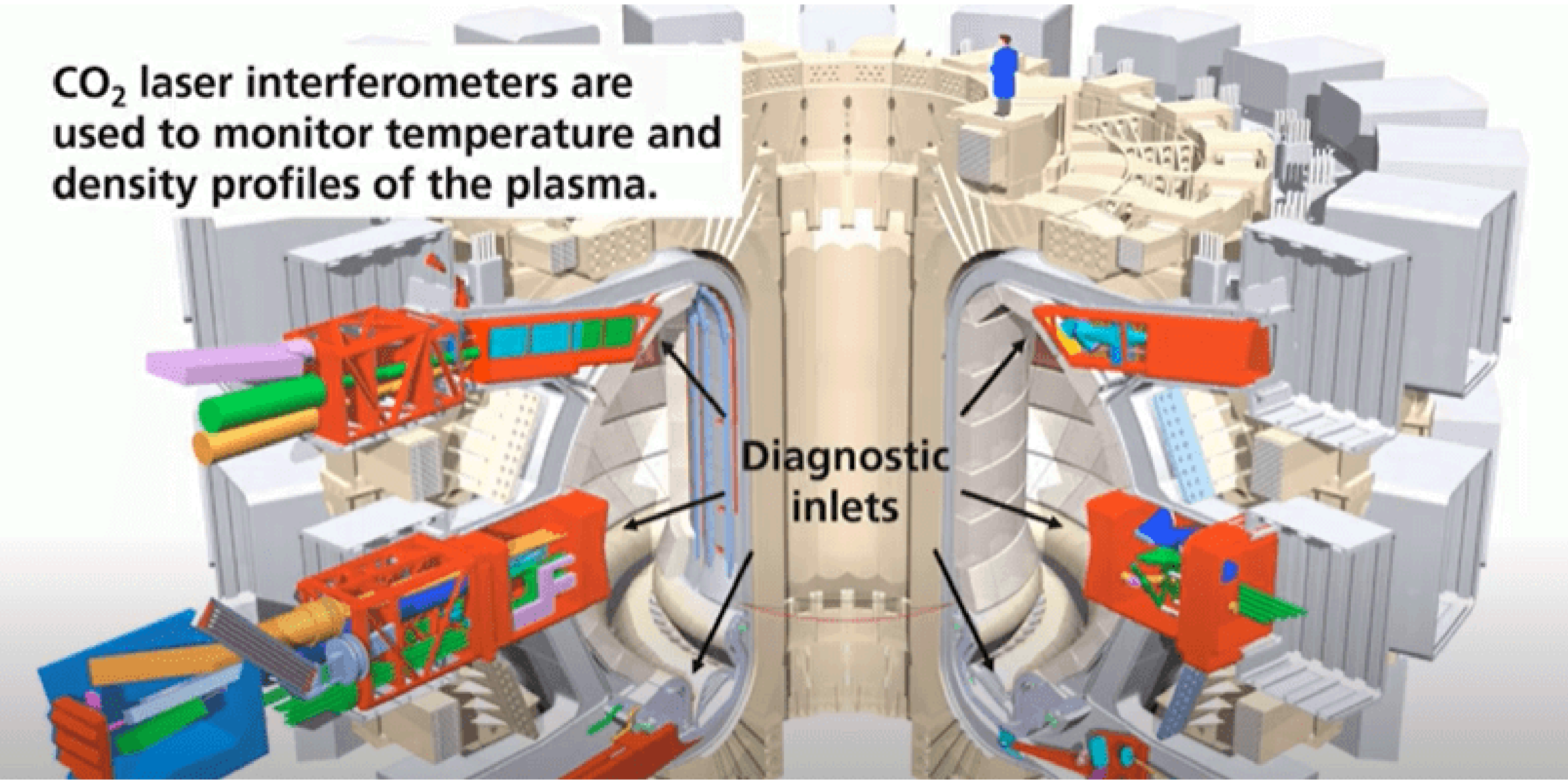
As we have learnt that there are magnetic chronogram in every QGP plasma, that makes us able to determined and creating the equations to make sure the energy harvesting process in the Tokamak can be controlled by the Tokamak capacity to moves from first phases the magnetism, untill the last phases, the cryostat.

The chemical nuclear fusion process that happens at the ITER Tokamak, are being controlled by the large magnetic capacity of the Torus, at the main core of tokamak, when the core materials are built to becoming plasma formed.

The main materials to build the torus is Niobium Selenoid (Nb3Sn). Niobium is more strong than ferrum, and more light, making us able to build large scale mega structures Tokamak Torus, with the intricacy that must be done very specifics.

By combining it with the fusion reaction acquired more results of the nuclear chemical reactions, Tritium. No matter how big the result of temperature that being forged in the scale of Celestial Fire near to 500 Mega Watt per Hour, on only several seconds or even minutes.

Tritium then resulting as the byproduct of the cryogenic phase of the deterium. These phases resulting unlimited power, and great fusion capability to reuse the tritium that were harvested. Before any trials, each prosess must be densely calculated and projective plan can be equated first, before it will be done on large scale, and igniting great power that can powerized a whole busy city for a day, with only several seconds or several minutes fusion activation.



Monitoring The Fusion Reactions

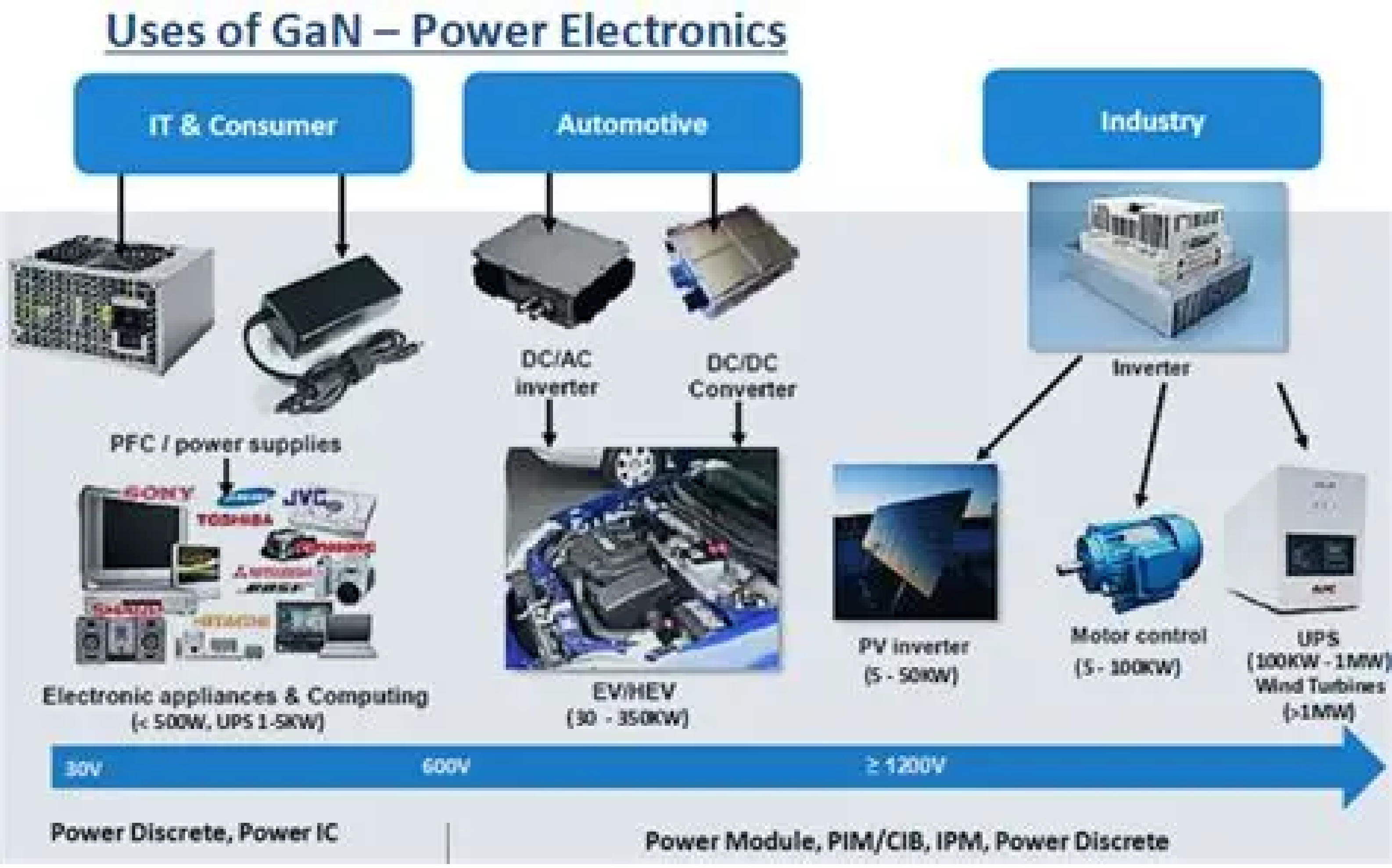
At the Tokamak, nuclear fusion reactions are being develop to generate Energy through the process that was resulting more power than the Stars. In a multi million degree celcius of Hot Plasma, Deterium and Tritium were fuse to Helium, releasing enormous amount of energy.

Co2 Laser interferometers are placed to detect, monitors, and controls temperature and density profile of the Plasma inside the Tokamak Torus. This laser interferometers are able to detect, measure, and calculate the heat of the plasma reactions precisely, and are important to monitor the Tokamak plasma reactions as the percent of fallacy of the detections is lower than 1%.

The plasma laser interferometers are placed in several level of height on the Tokamak. They also placing each of the laser interferometers in the several points of controls. To make sure that the plasma nueclear fussion reactors diagnostic that are being carefully observed.

Especially because there are several phases of the Fusion reactions that all needs to be monitored. As each phases are happens and activating different core at the fusion reactors, the needs to still being in controls of the whole magna measurement needing various placed CO2 interferometer in several critical points of fusion reactions.

Thus then the laser interferometry are working by each sending the interferometer wave to monitor single-line CO2 laser are critical for reliable measurement of plasma-induced phase shifts, in the plasma chamber.



New Options for Economic Electronic Materials

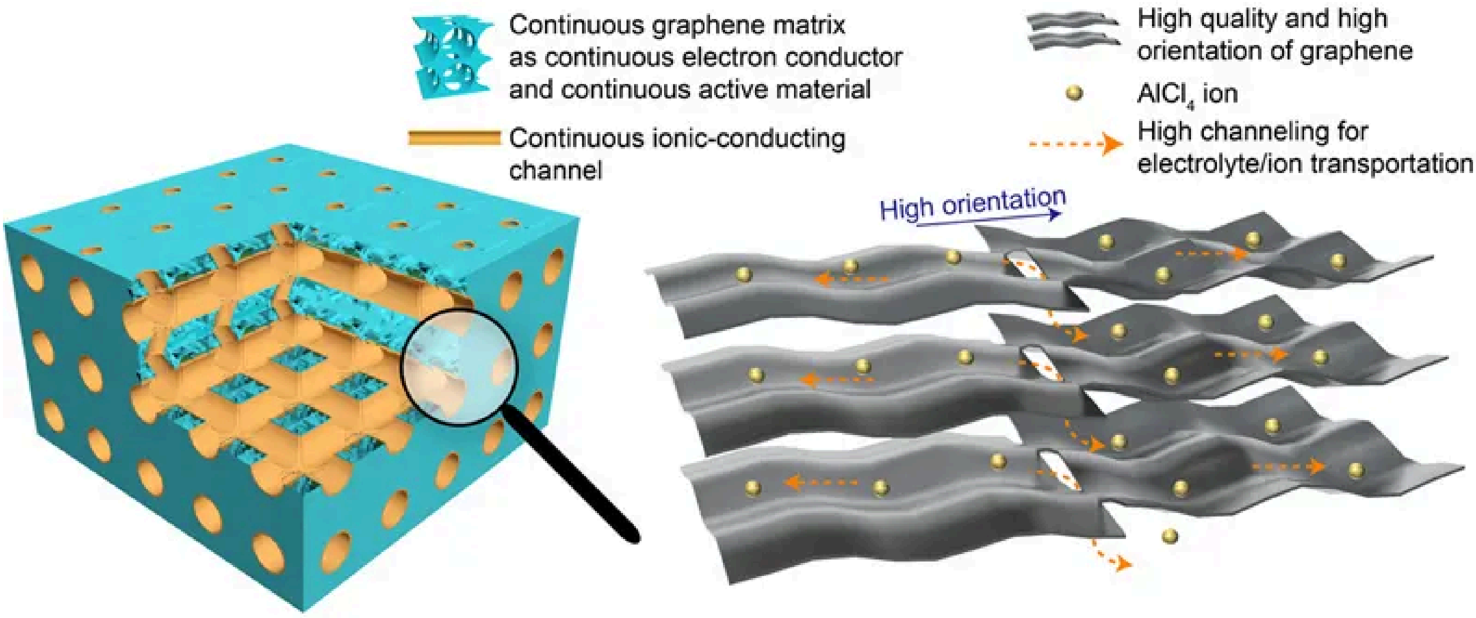
Gallium nitride (GaN) is one of the mineral that currently being used to create Semi Conductor. Not many people aware that we have been using this materials at LED (light emiting diodes) since the 1990s. Because of the Galium Nitride compound is very hard solid materials which has Wurtzite crystal structures, GaN have high power and high frequency if being used in optoelectronics.

Also because GaN has highly sensitive to ionizing ultra violet natural radiations, this makes it suitable for solar cell arrays for satellites, and also for military and space applications. Because GaN are also have shown to have high stability in high radiation environments. GaN technologies are becoming more and more common in a variety of applications, including: High-power motor drives, Quick-charging adapters, Telecom, High-performance computing, Space applications, Automotive, Cloud systems, Voltage converters, and for Electric vehicles, are also because GaN has the promising characteristics for TeraHertz devices.

GaN also have high stability on high temperature operations, and work at much higher voltages. GaN also has high power density and voltage breakdown limits. So making it as promising options for 5G cellular base station applications. Since the early 2020, GaN power transistors have replacing many usage of power supplies in electronic equipment.

Because of the materials solidity, GaN are mechanically stable, and has wide-bandgap as semiconductor materials, with high heat capacity and thermal conductivity. The solidity also makes GaN more resisitive against cracking and can be deposited in thin film on sapphire or silicon carbide.

How does the graphene battery work



Searching for semiconductor materials that has higher capacity than silicon, are at race now. There are for main reason why this GaN technology are urgent to be accepted. Its because of these factors; Performance, Cost, Production Capacity, and Reliability, not to mention there has been increasing global chip-supply shortage happening right now. Also because of the solidity structure of GaN materials, it is two to ten times better than Silicion Carbide in the field of electrical performance, resulting in many performance advantages.

Silicon Carbide has its weakness, that is because of the materials are quite fragile, and sensitive to temperature rising. This makes it more costly to provide large system packaging and cost of cooling system. While GaN properties allow systems to achieve higher power density than with Silicon Carbide, resulting in lower system costs with Gallium Nitride.

At production level, Silicon Carbide is also expensive to be subtrated from its original forms, have higher raw material cost, and limited supply, only can be done with specialized processes. While GaN production processing are more low cost and higher yields.

The third area of technology comparison is transistor reliability. In this metric, GaN Systems transistors are designed to meet automotive reliability standards including AEC-Q101 qualification. They have proven their reliability in the test lab, in drivetrain systems and in Formula E racing. On the company's collaboration with automotive partners to prove its transistors lifetimes exceed market requirements. In this approach, device failure modes, transistor test design, test-to-failure process and enhanced product qualification processes were implemented.

Galium Nitride

One of the earliest syntheses of gallium nitride was at the George Herbert Jones Laboratory in 1932. An early synthesis of gallium nitride was by Robert Juza and Harry Hahn in 1938. GaN with a high crystalline quality can be obtained by depositing a buffer layer at low temperatures.

Such high-quality GaN led to the discovery of room-temperature stimulated emission (essential for laser action). This has led to the commercialization of high-performance blue LEDs and long-lifetime violet laser diodes, and to the development of nitride-based devices such as UV detectors and high-speed field-effect transistors.

Gallium nitride is a transformative material in the semiconductor industry, offering significant advantages in efficiency, power handling, and thermal performance. Its applications span various fields, from consumer electronics to advanced telecommunications, making it a critical component in the future of technology. As GaN technology continues to evolve, it is expected to replace silicon in many high-power and high-frequency applications, paving the way for more efficient and compact electronic devices.

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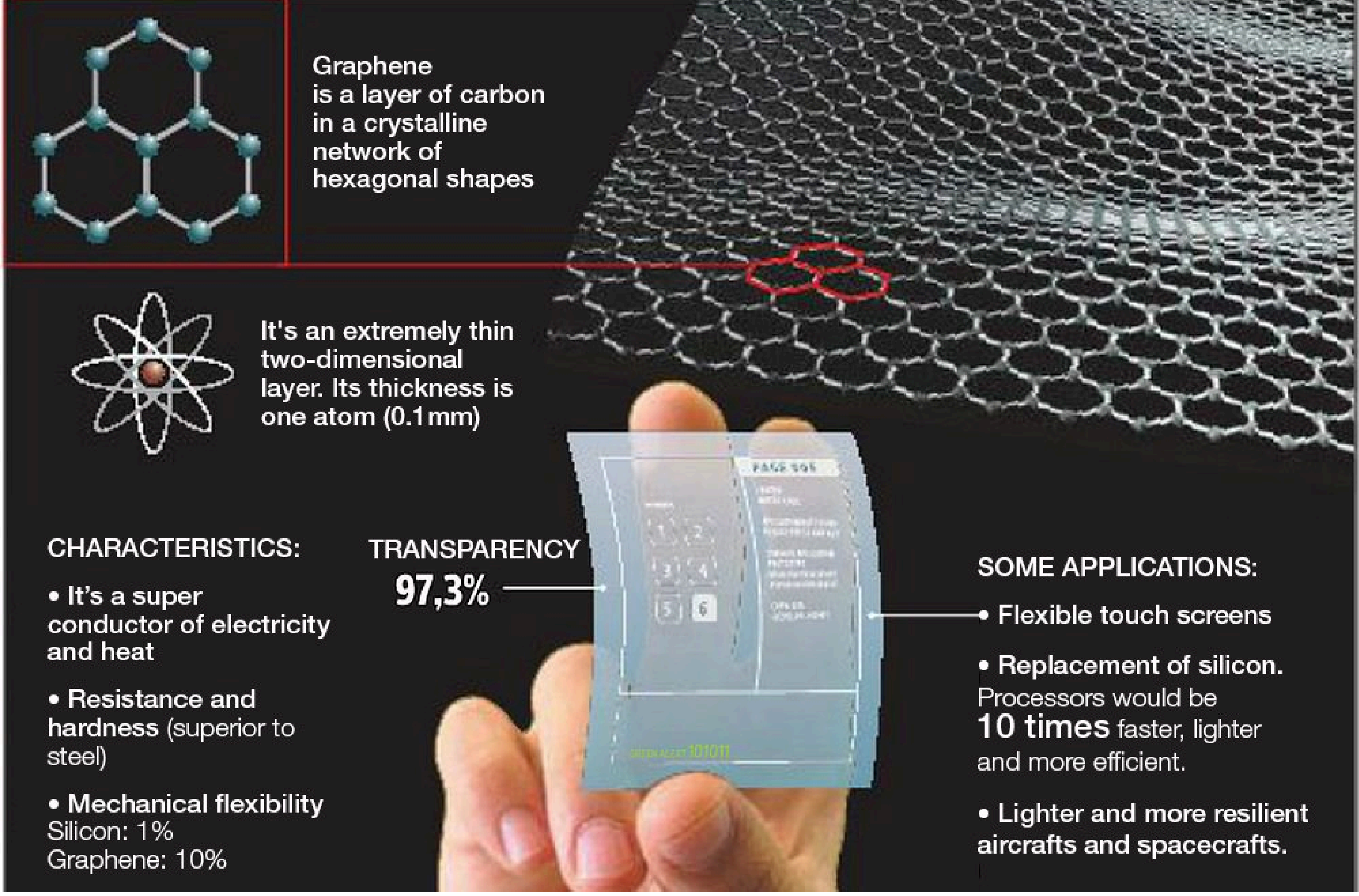


GaN is characterized by its hardness, mechanical stability, and high thermal conductivity, making it suitable for various demanding applications.

Key Properties

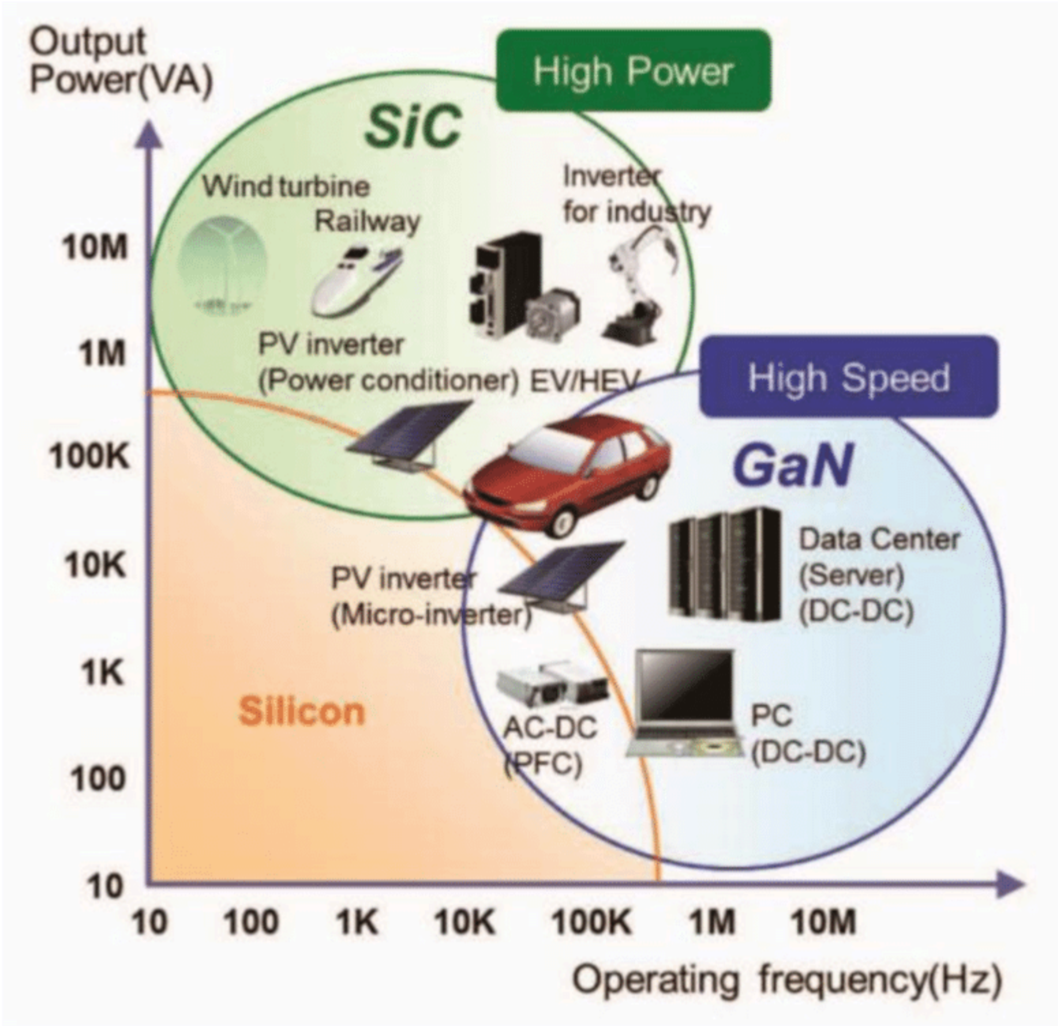
- High Breakdown Voltage: GaN can sustain higher voltages, making it ideal for power devices and applications in telecommunications and power grids.
- Fast Switching Speed: GaN devices can switch faster than silicon devices, which is crucial for high-frequency applications such as RF amplifiers and microwave devices.
- Thermal Efficiency: GaN's high thermal conductivity allows for better heat dissipation, reducing the need for additional cooling components in electronic systems.

Applications of GaN

1. Power Electronics: GaN is increasingly used in power converters, chargers, and power supplies due to its efficiency in converting AC to DC and vice versa. GaN-based devices can reduce power loss by up to 80% compared to silicon solutions.
2. LED Technology: GaN has been pivotal in the development of blue and white LEDs, revolutionizing lighting technology since the 1990s.
3. Telecommunications: GaN is utilized in 5G technology and RF applications, enabling faster data transmission and improved signal quality.
4. High-Temperature Applications: GaN devices can operate at temperatures up to 400 °C, making them suitable for harsh environments, such as aerospace and military applications.

Advantages Over Silicon

- Higher Power Density: GaN devices can handle more power in a smaller footprint compared to silicon devices, leading to lighter and more compact designs.
- Improved Efficiency: GaN's ability to conduct electrons more efficiently (up to 1,000 times more than silicon) results in faster processing capabilities and reduced energy waste.
- Cost-Effectiveness: While GaN devices are currently more expensive than silicon, the potential for reduced manufacturing costs and improved efficiency may lead to lower overall system costs in the future.



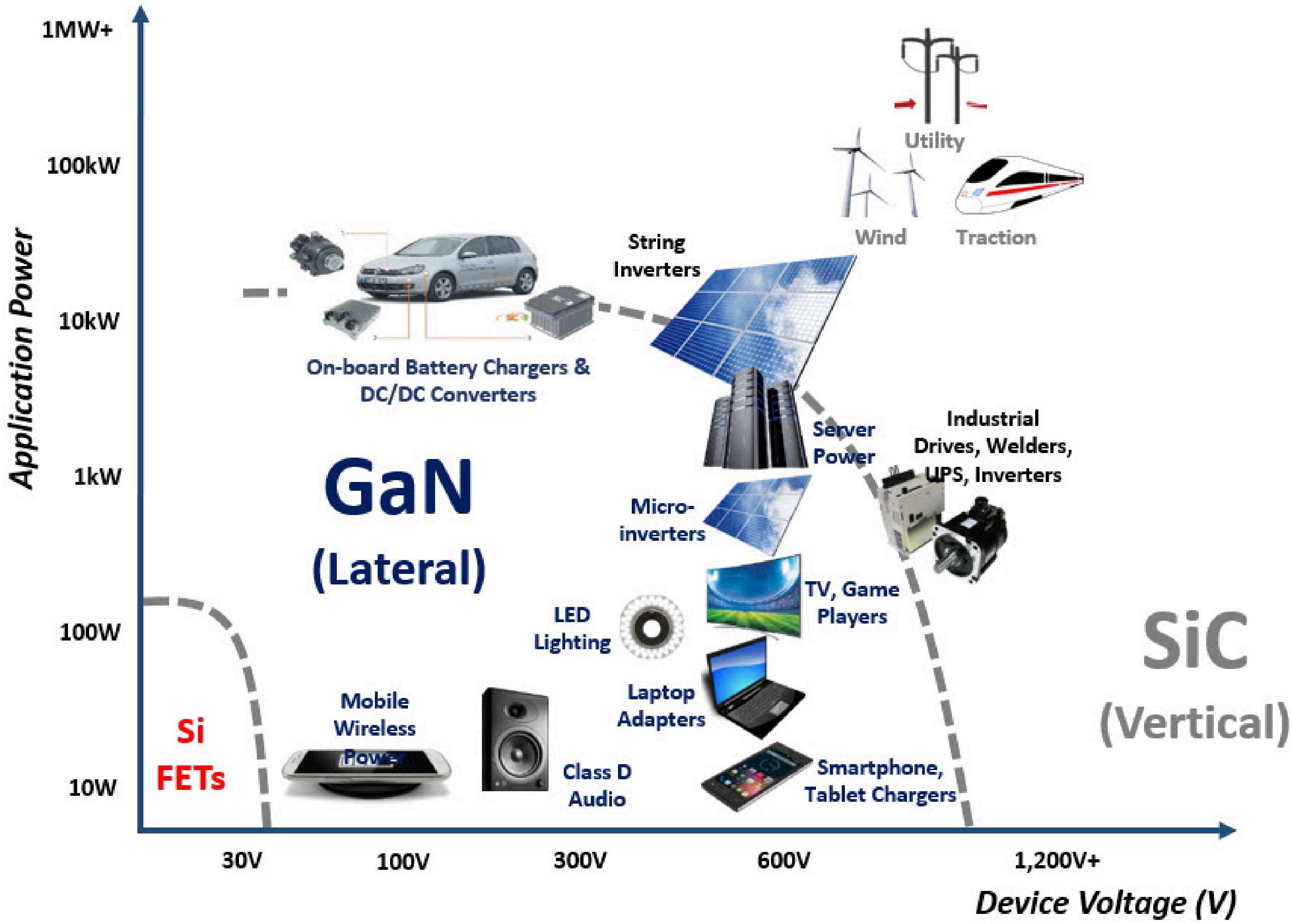
The very high breakdown voltages, high electron mobility, and high saturation velocity of GaN has made it an ideal candidate for high-power and high-temperature device with microwave wavelength applications.

Potential markets for high-power/high-frequency devices based on GaN include microwave radio-frequency power amplifiers (e.g., those used in high-speed wireless data transmission) and high-voltage switching devices for power grids.

A potential mass-market application for GaN-based RF transistors is as the microwave source for microwave ovens, replacing the magnetrons currently used. The large band gap means that the performance of GaN transistors is maintained up to higher temperatures (~400 °C) than silicon transistors (~150 °C) because it lessens the effects of thermal generation of charge carriers that are inherent to any semiconductor.

The first gallium nitride metal semiconductor field-effect transistors (GaN MESFET) were experimentally demonstrated in 1993 and they are being actively developed.

GaN power ICs monolithically integrate a GaN FET, GaN-based drive circuitry and circuit protection into a single surface-mount device. Integration means that the gate-drive loop has essentially zero impedance, which further improves efficiency by virtually eliminating FET turn-off losses.



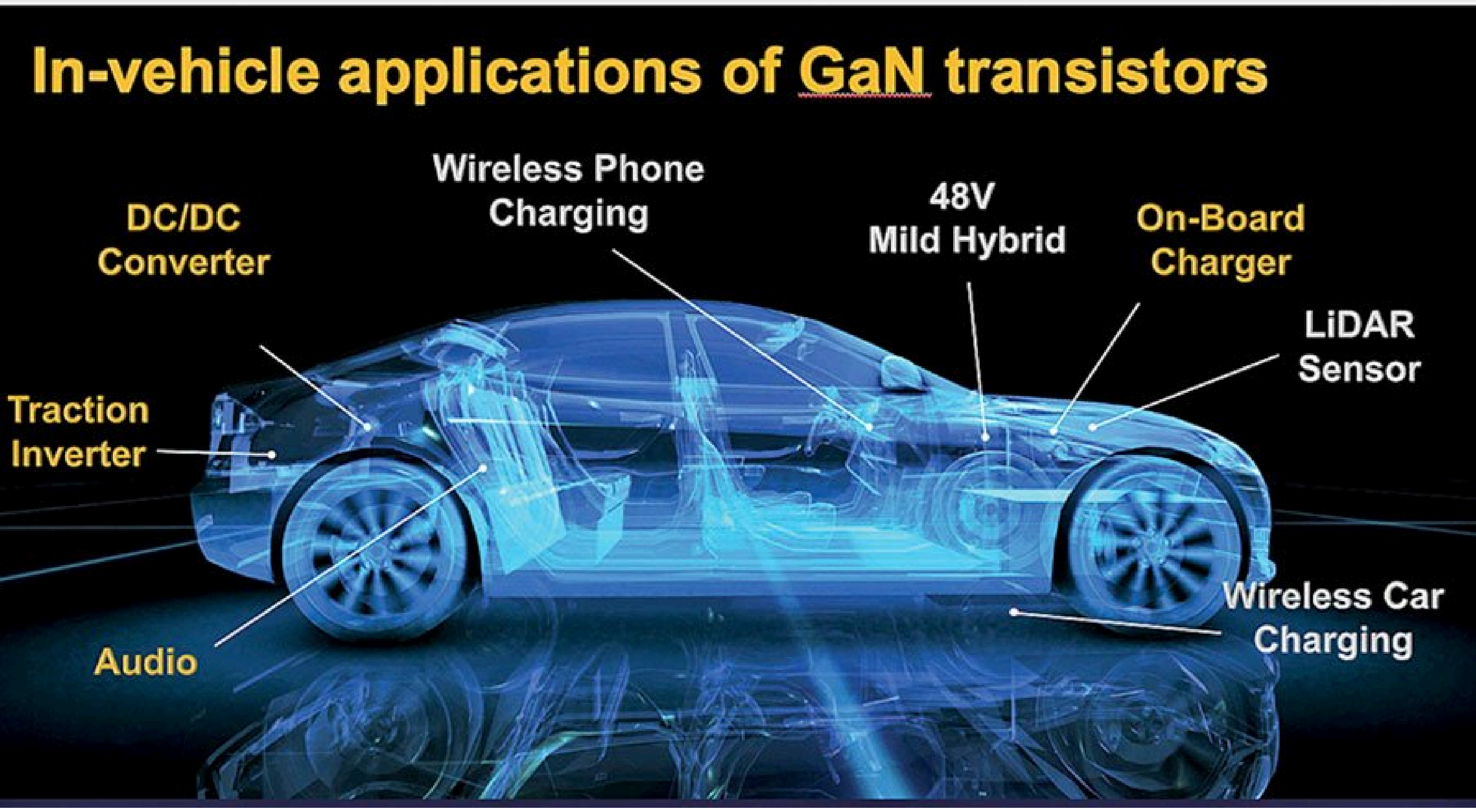
Gallium nitride (GaN) have a high breakdown voltage, fast switching speed, and thermal efficiency. that makes it able to face heat dissipation, and eliminating the needs for cooling components in electronic systems. Galium Nitride can also sustain higher voltage, and very ideal for power devices and ideal also for applications in telecommunications and power grids that needing high type of voltages. Galium Nitride can also switch faster than silicon devices, which is crucial for high frequency applications such as RF Amplifiers and microwave devices.

Character of the Gallium Nitride that make is valuable is like metal hard, stability as mechanical materials, has high thermal conductivity, and suitable for various demanding applications. Inclucing in Military and aerospace environments, because GaN can operate at temperatures up to 400 degrees celcius. GaN also used in power converters, chargers and power supply because its efficiency in converting from AC to DC and vice versa. GaN based devices can also can reduce power loss by up 80% compared to silicon carbide.

At the field of GaN technology, GaN has been pivotal in the development of blue and white LEDs, and makes it able to develop LED screens and has revolutionize lighting technology since the 1990s.
For 5G technology and Radio Frequency applications, GaN makes it able to enable faster data transmission and can also improves signal quality.

Compared to Silicon Carbide, GaN can handle more power in a smaller footprint, compared to silicon devices, and enable the development of lighter and more compact electronic and electrical design. Galium Nitride also able to conduct electrons more efficient until a thousand more than silicon based, so this then resulting more faster computer processing capabilities and reduced in energy wastes. Now Galium still more expensive than silicon, but the potential for reducing silicon can then be a reason to improved more efficiency and can enable more lower overall system costs in the future.

Galium Nitride for Next Generation Transistors

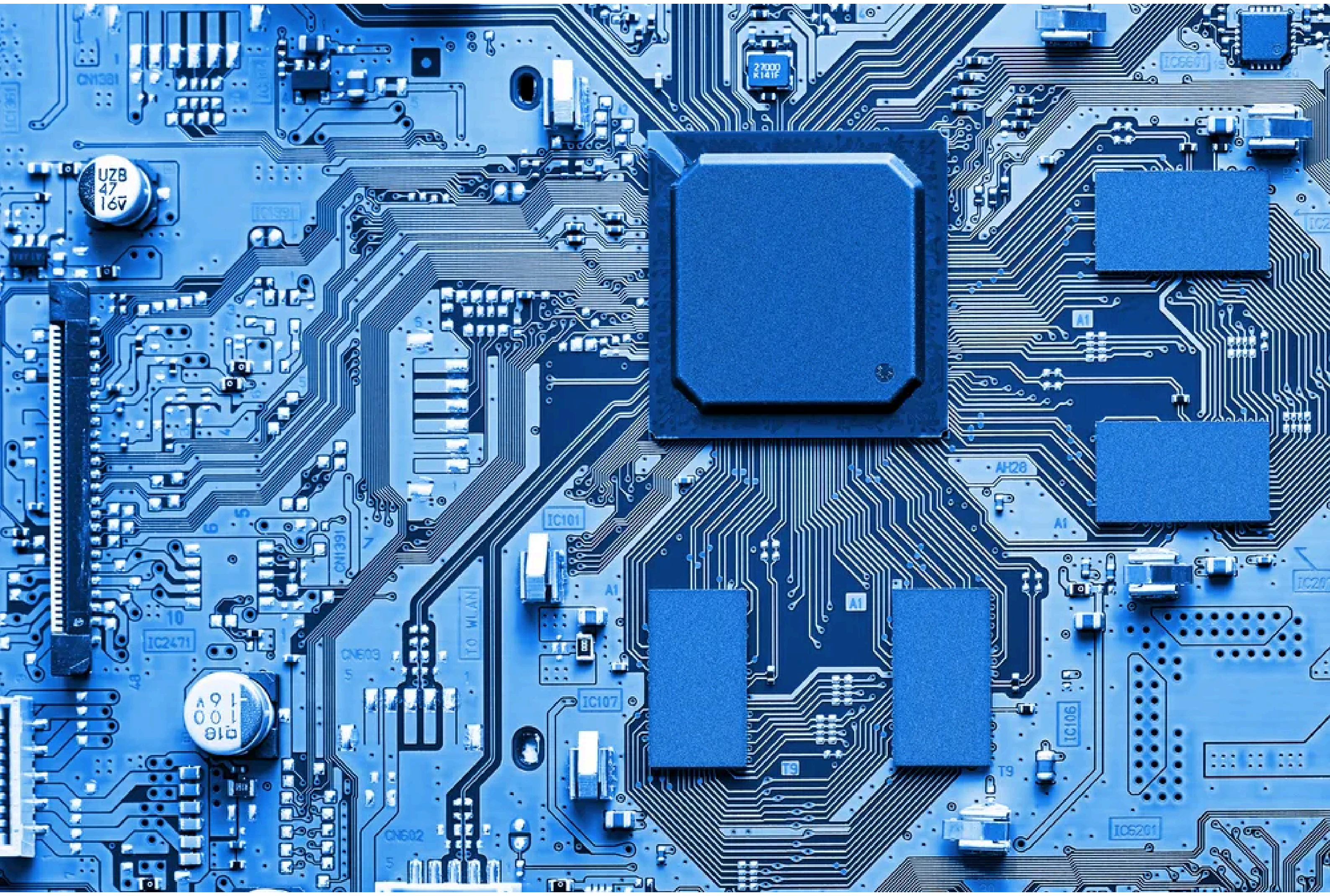


The following examples provide an overview of how GaN is implemented in EV powertrain functions, as well as the efficiency and power-density benefits of GaN-based systems:

- Onboard charger: GaN power semiconductors contribute to more space-efficient propulsion-system designs, opening up new volume for other vehicle components with OBC integration.
- DC/DC converter: Power conversion (e.g. 400V-to-12V or 48V-to-12V) from the vehicle battery is needed to support accessory systems with low voltage needs.
- Traction inverter: While an EV's propulsion system (traction inverter plus electric motor) is five times more energy efficient than IC engines, with lower maintenance costs and longer lifespan, the upfront cost has on average been 2.5 times higher.
- Technology innovation in materials, magnetics and electronics is creating new-generation motors that are more energy efficient (less power loss through heat), compact and lighter in weight. GaN power semiconductors are key to the evolution of traction inverters capable of delivering more than a 70% power increase compared to inverters using traditional IGBTs.

Increased efficiency and decreased power-system size and weight will enable EVs to drive further even without any change in current battery capabilities. Comparison testing conducted in 2020 by GaN Systems, in partnership with a customer, showed that the efficiency of a GaN-based traction inverter is improved significantly by reducing power losses by 50%, resulting in battery energy saving – and ultimately extended driving range.

Using Tesla Model S as an example (curb weight: 2,200kg/4,850 lb.; battery capacity: 75 kWh; inverter max power: 200kW; 400V battery systems), the mileage can be estimated based on two driving scenarios. One scenario is with constant 60 km/h (37 mph) speed, the other is based on the Worldwide Harmonized Light-vehicle Test Procedure (WLTP) Class 3b driving cycle. With the GaN-based inverter, the driving range is extended 6-10% compared to a conventional Si IGBT traction inverter.



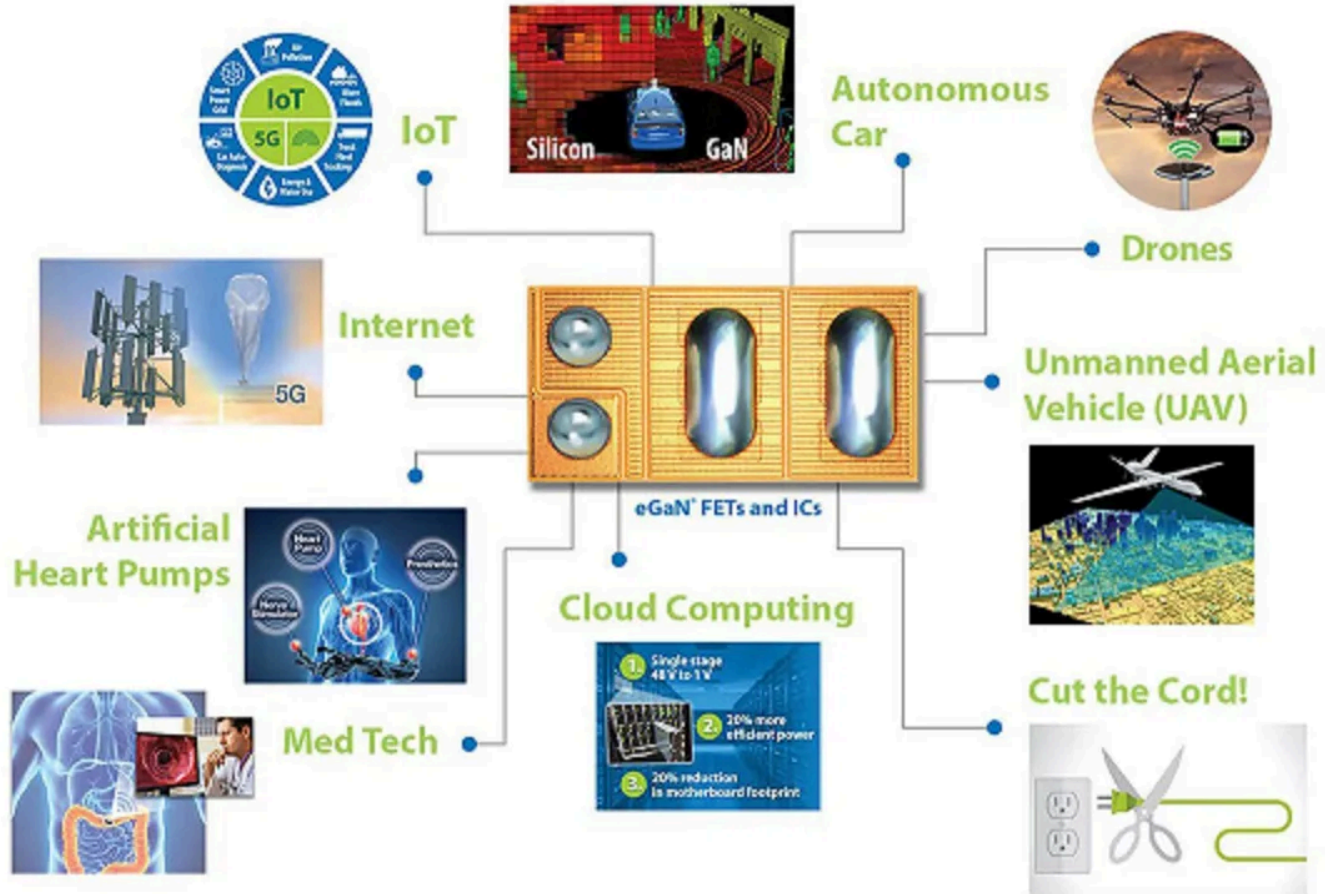
GaN for Transistors and power ICs, as shown above, the GaN high-electron-mobility transistors that were manufactured by Ferdinand-Braun-Institute, has been made to 1 cent-size transistors. GaN transistors are suitable for high frequency, high voltage, high temperature and high-efficiency applications. GaN is efficient at transferring current, and this ultimately means that less energy is lost to heat.

GaN high-electron-mobility transistors (HEMT) have been offered commercially since 2006, and have found immediate use in various wireless infrastructure applications due to their high efficiency and high voltage operation. A second generation of devices with shorter gate lengths will address higher-frequency telecom and aerospace applications.

GaN-based metal–oxide–semiconductor field-effect transistors (MOSFET) and metal–semiconductor field-effect transistors (MESFET) also offer advantages including lower loss in high power electronics, especially in automotive and electric car applications. Since 2008 these can be formed on a silicon substrate. High-voltage (800 V) Schottky barrier diodes (SBDs) have also been made.[42]

The higher efficiency and high power density of integrated GaN power ICs allows them to reduce the size, weight and component count of applications including mobile and laptop chargers, consumer electronics, computing equipment and electric vehicles.

GaN-based electronics (not pure GaN) have the potential to drastically cut energy consumption, not only in consumer applications but even for power transmission utilities.



Unlike silicon transistors that switch off due to power surges, GaN transistors are typically depletion mode devices (i.e. on / resistive when the gate-source voltage is zero). Several methods have been proposed to reach normally-off (or E-mode) operation, which is necessary for use in power electronics:

- the implantation of fluorine ions under the gate (the negative charge of the F-ions favors the depletion of the channel)
- the use of a MIS-type gate stack, with recess of the AlGaN
- the integration of a cascaded pair constituted by a normally-on GaN transistor and a low voltage silicon MOSFET
- the use of a p-type layer on top of the AlGaN/GaN heterojunction

Advantages Over Silicon

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Radars made with Galium Nitride

GaN technology is also utilized in military electronics such as active electronically scanned array radars. Thales Group introduced the Ground Master 400 radar in 2010 utilizing GaN technology. In 2021 Thales put in operation more than 50,000 GaN Transmitters on radar systems.

The U.S. Army funded Lockheed Martin to incorporate GaN active-device technology into the AN/TPQ-53 radar system to replace two medium-range radar systems, the AN/TPQ-36 and the AN/TPQ-37.

The AN/TPQ-53 radar system was designed to detect, classify, track, and locate enemy indirect fire systems, as well as unmanned aerial systems. The AN/TPQ-53 radar system provided enhanced performance, greater mobility, increased reliability and supportability, lower life-cycle cost, and reduced crew size compared to the AN/TPQ-36 and the AN/TPQ-37 systems.

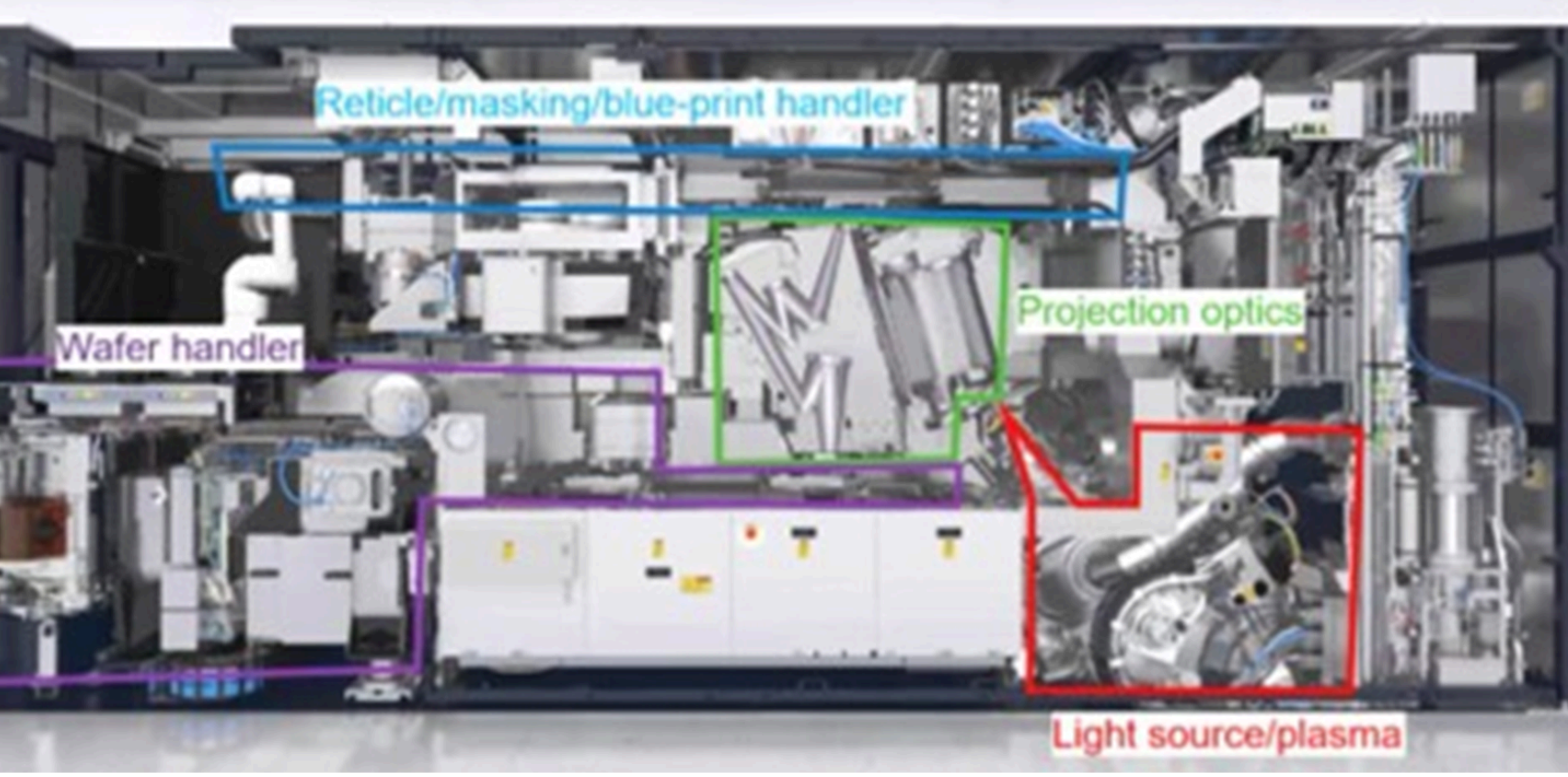
Lockheed Martin fielded other tactical operational radars with GaN technology in 2018, including TPS-77 Multi Role Radar System deployed to Latvia and Romania. In 2019, Lockheed Martin's partner ELTA Systems Limited, developed a GaN-based ELM-2084 Multi Mission Radar that was able to detect and track air craft and ballistic targets, while providing fire control guidance for missile interception or air defense artillery.

On April 8, 2020, Saab flight tested its new GaN designed AESA X-band radar in a JAS-39 Gripen fighter. Saab already offers products with GaN based radars, like the Giraffe radar, Erieye, GlobalEye, and Arexis EW. Saab also delivers major subsystems, assemblies and software for the AN/TPS-80 (G/ATOR)

India's Defence Research and Development Organisation is developing Virupaakhsha radar for Sukhoi Su-30MKI based on GaN technology. The radar is a further development of Uttam AESA Radar for use on HAL Tejas which employs GaAs technology. [57][58][59]

Turkish Aselsan company delivered the first GaN-based Turkish AESA radar, ALP 300-G, to the Turkish Armed Forces in May 2024. GaN nanotubes and nanowires are proposed for applications in nanoscale electronics, optoelectronics and biochemical-sensing applications. When doped with a suitable transition metal such as manganese, GaN is a promising spintronics material (magnetic semiconductors)

From DUV to Extreme Ultra Violet



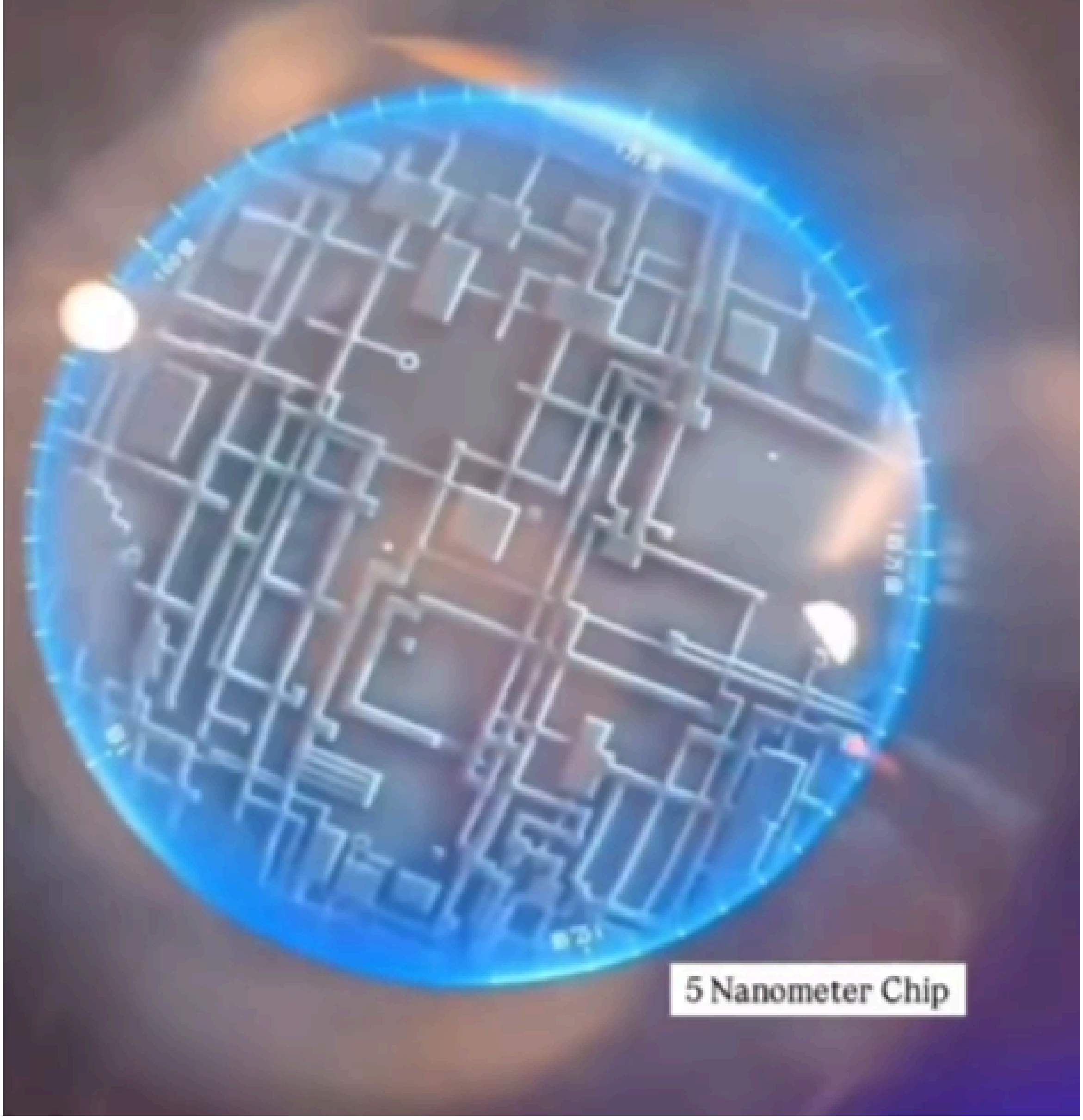
In the process of making microchip/ semi conductor, there's pattern making which was done with the help of Ultra Violet Litography. Before Extreme ultra violet was invented, there was Deep Ultra Violet.

But there are issues in the short wave length it can beam to reach the wafer plate of the microchip. That's why then many scientist from multi discipline then developing The Extreme Ultra Violet Litoghraphy, which has the capacity to beam more precise patterns to the wafer layers of the microchips/ semi conductor.

This new technology then bring more advance mode for the use of microchip, since 1986 in Japan. More precise details can then be build by this ultra fine extreme ultra violet beam lights.

EUV light are also can absorb in many materials. The transformations is like from using dull pencils to using ultra fine mechanical pencils. We can create more high end pictures on the silicon wafer in the making of the intended microchip that you will be using.

At the late 2023 we has seen how european semi conductor company has started to produce 7nm- 2nm by using EUV Litography. We can see how future generation will be using much smaller microchip than what we are having today.



Apple's 5nm chip, seen by microscope electron. The microchip are made by TSMC

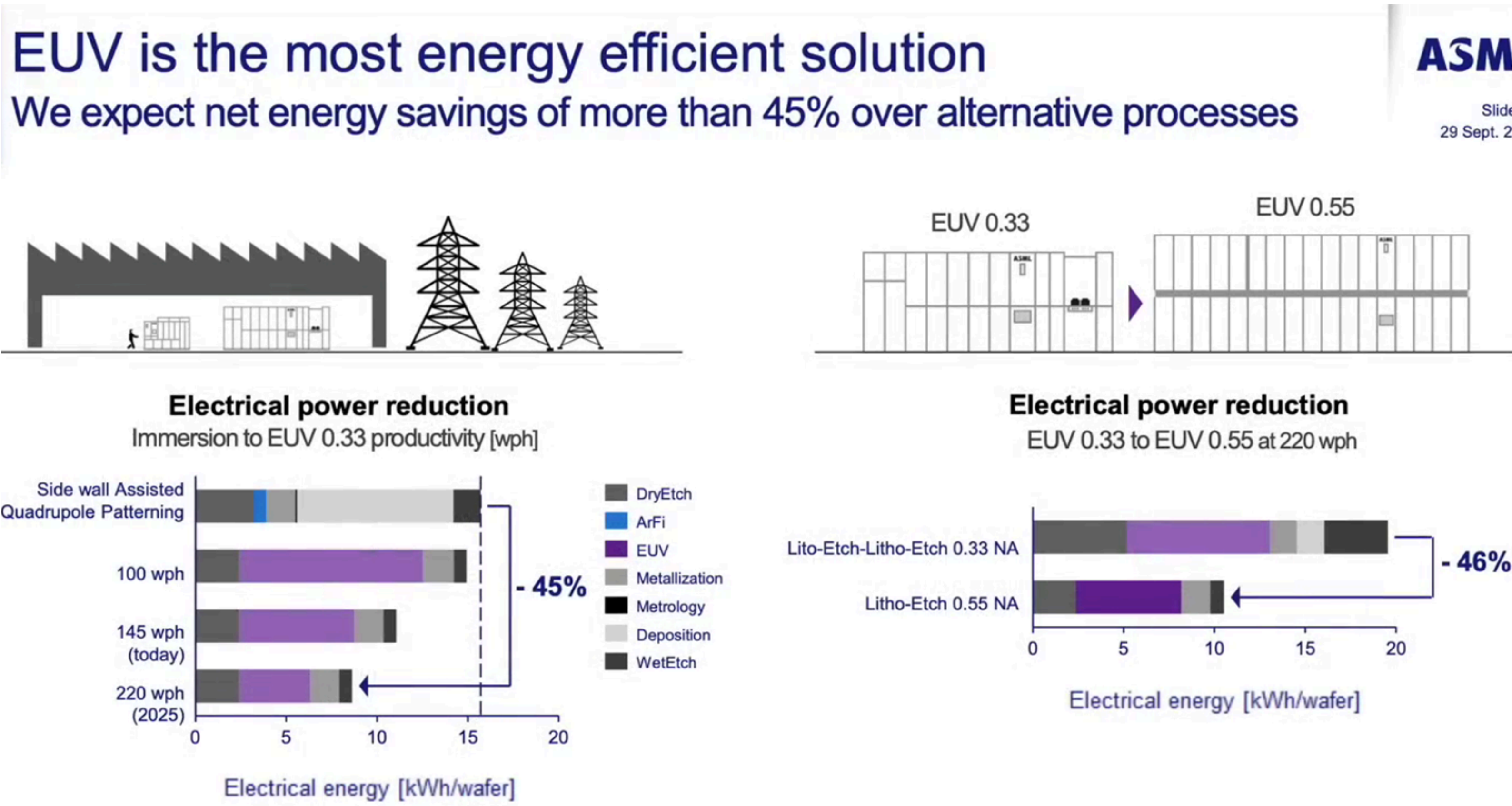
The Race for Extreme Ultra Violet Semi Conductor Component

TSMC and Samsung are at race with ASML, in creating the machine that can produce microchip litography machines with the technology of Extreme Ultra Violet reprinting.

Both Samsung and TSMC rely heavily on extreme ultraviolet (EUV) lithography, which uses 13.5 nm wavelength light to etch patterns onto silicon wafers, to fabricate more complex design, thanks to more smaller path ultra small pattern semi-conductor path making in the etching process where silicon wafers then are to be made more dimensionalized and more intricates, with more advance layer making at the wafers litography processing.

EUV machines, made exclusively by ASML, are insanely complex—think of them as room-sized marvels costing over $150 million each. While at the other part of globe, building a 5 nm microchip fabrication costs upwards of $15 billion—TSMC's Tainan plant and Samsung's Pyeongtaek line are prime examples. Only a handful of companies can produce that, and even fewer have the customer base (Apple, Qualcomm, AMD) to justify it.

Today, Apple now has creates their own 5nm chips with the detail that can only be seen under electron microscope, with the help of Samsung and TSMC Litography Semi Conductor Foundry.



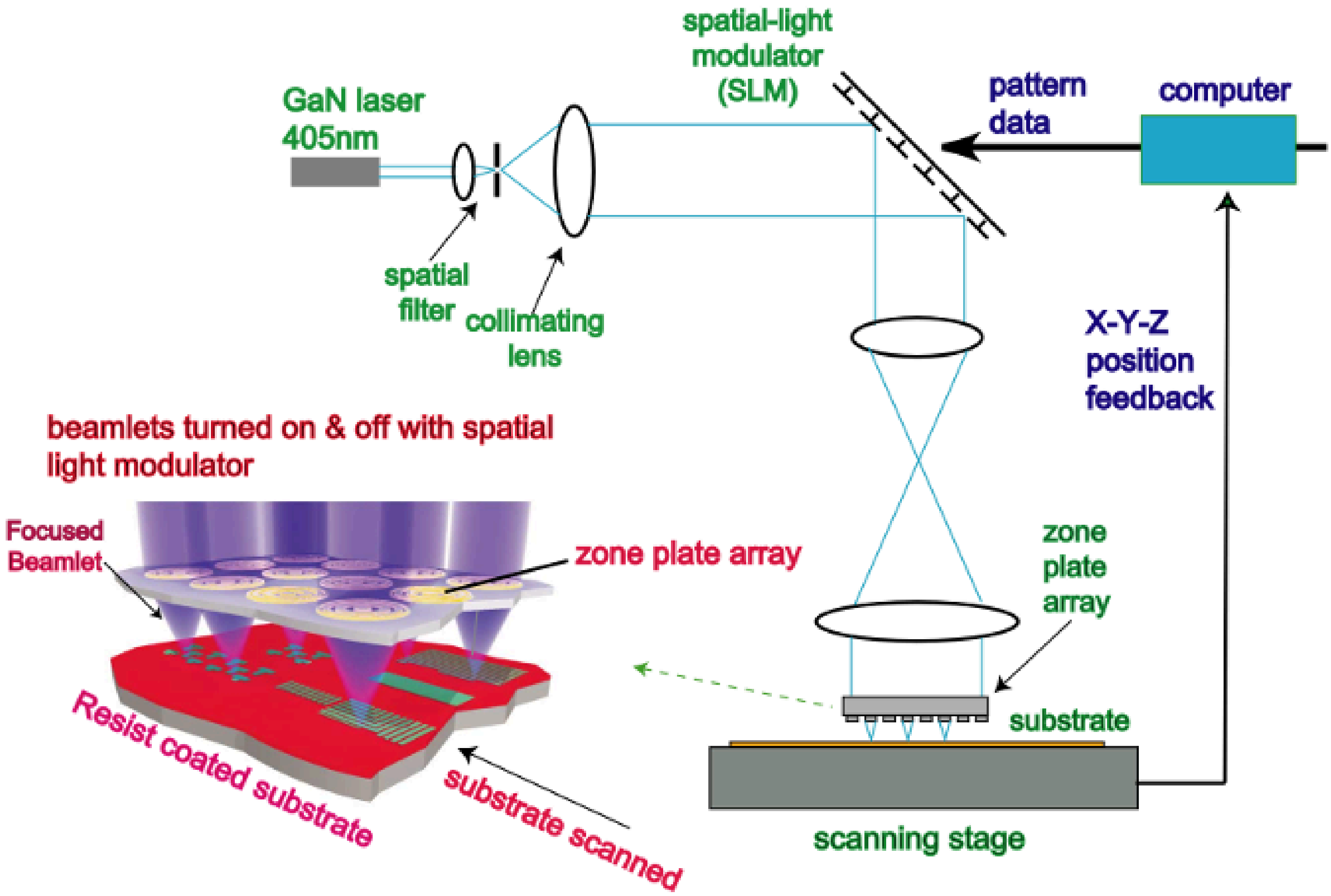
The New Race for Multiple Pattering Numerical Aperture (NA-EUV) for Creating highly intricates Semi Conductor Component

What's Next after Extreme Ultra Violet? Multiple Patterning - High Numerical Aperture, is the multi layers multi pattern production at the Semi Conducture Foundry. Its because the EUV Process was too slow, so the foundry makers then they are thinking to create many pattern at once, in the name of productivity and efficient processing.

This Numerical Aperture multi pattern are also done by doing multiple layering at each of the wafer of the semi conducture that are being produce, whether its at ASML, or at Samsung Foundry and TSMC production facilities.

This microchip race itself is a multi billion dollar race. Without the solid client base to make sure the experiment for advancing the productions will be largely accepted by the markets. Whether it will end up for excellent and super fast gaming laptop, or to being used for reasearcher for developing many new technologies, or it will be used at the brink of AI inventions, every microchip are not made to be more simple.

On the contrary, every new semi conductor technologies are elevated to be made to be more advance and intricates. On further projections, the Semi Conductor inventions are aiming to create reductions it the needs for the electrical power. With smaller tools that can be created, data centers nowadays can be made smaller, and more energy efficients, with many efficiency increasing in the field of Electrical Power Reductions.



How is Multiple Pattering High Numerical Aperture (High NA-EUV) works for Creating highly intricates Semi Conductor Component

Numerical aperture (NA) means more lenses to be used in creating the image for the Litography multi layered processing. Each of the lenses aperture are made to hinder any modes of interlapse of one lenses and another, to make the etching semi conductor pathways patterning on each layers of the wafered layered inside a nanometer scale microchips.

When the NA showing their number is at 0.33, we are expecting the results to double the precisiveness in the semi conductor litograpy making up to 4 times multiplied. After this sucess, the inventor then tries to elevate the game with adding the NA number to be 0.55, and the magnifications to be at 8 times multiplied.

This creates and advancement and resulting the more 8 times more smaller reticle patterns to be projected etched in every wafers of the targeted development on the semi conductor nanochips. This machine made by ASML currently has price tags above 380billion dollars.

They are targeting their foundry machines to be bought by asian microchip foundies such as Samsung and TSMC, but both of the microchip manufacturer has already have everything planned and developed for the year 2030, to make sure all the development are aligned with the development of electronic creations that will be more sub-atomic until then.