FLOSFIA

Corporate Profile

Global Leading Company Implementing Gallium Oxide Power Device into Society

Sep, 2020

FLOSFIA Inc.

Corporate Profile

(As of September 1, 2020)

Trade Name	FLOSFIA INC.
Head Office	1-29 Goryo-Ohara, Nishikyo-ku, Kyoto
Business	(1) Development and manufacture of devices using next-generation semiconductor materials “gallium oxide” (GaO™ devices) (2) Development and manufacture of new electronic materials and industrial materials produced by MIST DRY™ method
Establishment	March 31, 2011
Capital	3,790 million yen (including capital reverse)
Executive Officers	President: Toshimi Hitora [CEO] Director: Takashi Shinohe [CTO] Director: Chinami Majima [CAO] Outside Director: Yasuo Nishiguchi (Part-Time) Outside Director: Naonori Kurokawa (Part-Time) Outside Director: Satoshi Yamaguchi (Part-Time) Full-Time Auditor: Kazuyuki Nishida Outside Auditor: Hideki Tsuji (part-time) Outside Auditor: Tatsuo Mori (part-time)
Shareholders (excluding indivisual investors)	Brother Industries, Yaskawa Electric, Mitsubishi Heavy Industries, DENSO, SPARX Asset Management (Mirai Creation Fund), JSR, SBI investment (Mitsui Kinzoku-SBI Material Innovation Fund), Fujimi Inc. University of Tokyo Edge Capital, Nissay Capital, Miyako Capital, Energy Environmental Investment, Eight Roads Ventures, Kyoto University Innovation Capital, etc.
Number of Employees	54

Head Office, Manufacturing and Development Base
(Nishikyo-ku, Kyoto)

Management Team

Visionary Serial Entrepreneur Assembles Power Device Professional Team

President and Chief Executive Officer	Career Summary
Toshimi Hitora	Serial entrepreneur in the semiconductor field. Appointed to President and CEO of FLOSFIA in 2012 when he made up changing its business to power semiconductor. Leading the business by realizing world's best data with unmarked new material.

Director CTO	Career Summary
Takashi Shinohe 	Power device expert. Experienced IGBT and SiC developments from early development stage to operationization at dominant semiconductor company. Worked as Japan Representative in activity of the international standardis-ation of new semiconductor materials.

Director CAO	Career Summary
Chinami Majima 	Administrative experts. Experienced in IR, commercial law, and budget management in management planning division of listed companies. Contributed to capital and business partnerships in and after Series B by experiencing a wide range of practices, including financial accounting, human resources, general administration, and public relations.

Outside Director	Career summary
Yasuo Nishiguchi 	Representative business person in Japan, experienced president and chairman of Kyocera, and chairman and CEO of Sossionext. Practicing management of technology in the "high-tech × manufacturing" region, including electronic components such as semiconductors and ceramic parts, electronic equipment.

Award Record

Japan Venture Award 2019, Semiconductor of the Year 2020, and more

▼ November, 2011　IBTEC（Intel & UC Berkeley）
First Finalist as Japanese company


▼ March, 2017 JEITA [2nd Venture Award]
Prize-winning


▼ April, 2017　MUFG「Rise Up Festa」
Prize-winning


▼ August, 2017
[University venture award]
Prize-winning

▼ April, 2019
[Intellectual property Award]

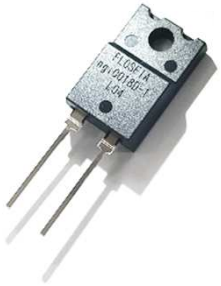
▼ June, 2020
Electric Device Industry News
[Semiconductor of the Year]
Grand prixs-winning

▼ June, 2018 METI [J-StartUp]
Nomination

▼ January, 2019
[Japan Venture Awards 2019]
METI Prize-winning


FLOSFIA Commercialized Innovative
“Gallium Oxide Power Device” Fastest in the World

1. Power Device Market Expansion
2. GaO™ Power Device Key Advantages
3. GaO™ Power Device Business Model
4. GaO™ Power Device Growth Strategy
5. Film-Deposition Synthesis Technology Platform



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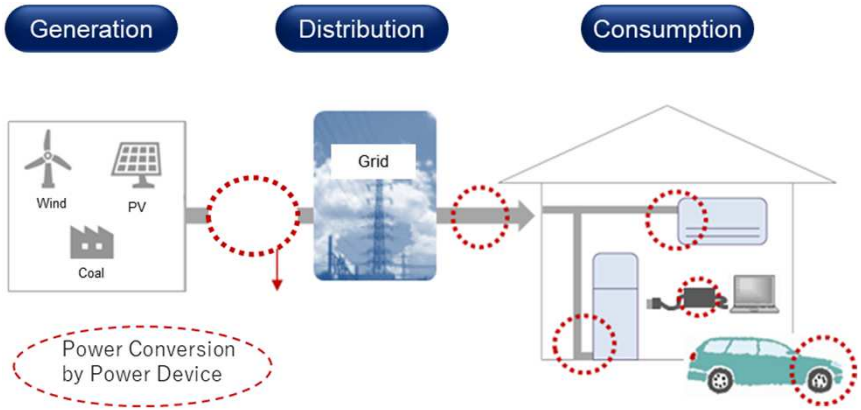
Power Device is a Key Solution to Connect Digital Technology and Environmental Management

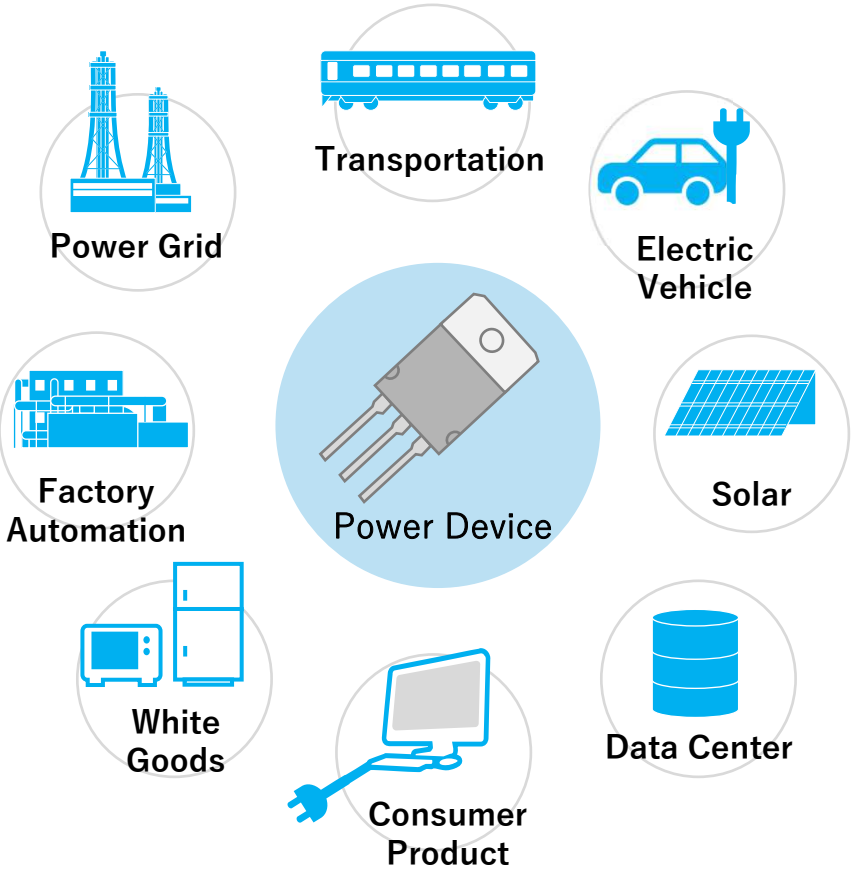
What is a Power Device?

- Key solution to manage electricity in “Smarter Way” at Industry 5.0 / CASE / IoT
- Cover wide-range voltages from Ultra High to Ultra Low across various industries

Power-Flow



Power Device in Everywhere & Every Application



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Key Requirements for Power Device
High Performance – Energy Saving – Low Cost

New Market Trend

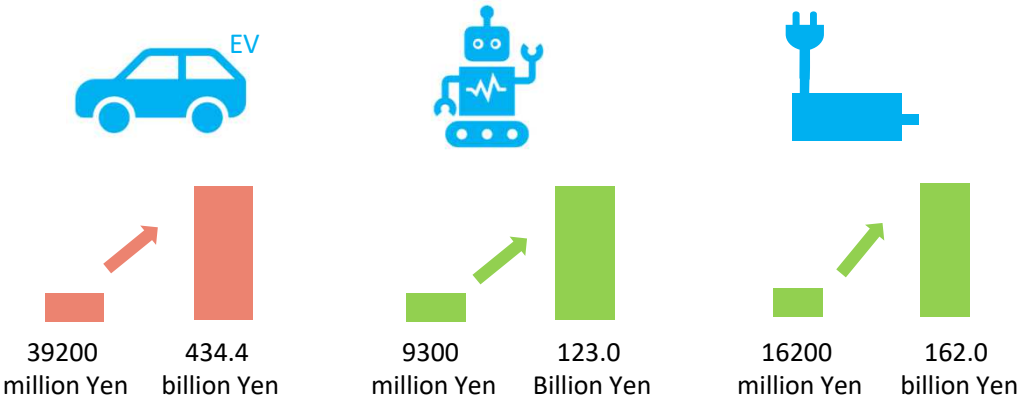
- **Importance of Environmental Management for SDGs**

  More than 10% of total power generation is LOST when conversion

- **New Trend CASE & IoT requires Higher performance and Lower costs**

  Demand Increase for Low-Loss and Compact of power supplies and inverters

New Market Launch



Source: Our estimates for the electric vehicle market,Our estimates for the industrial, consumer, and information and communications equipment areas are based on Fuji Economy's "Current Status and Future of the market for the Next-Generation Power Device and Power Electric-Related Equipment Market" in 2018 edition.

Solution

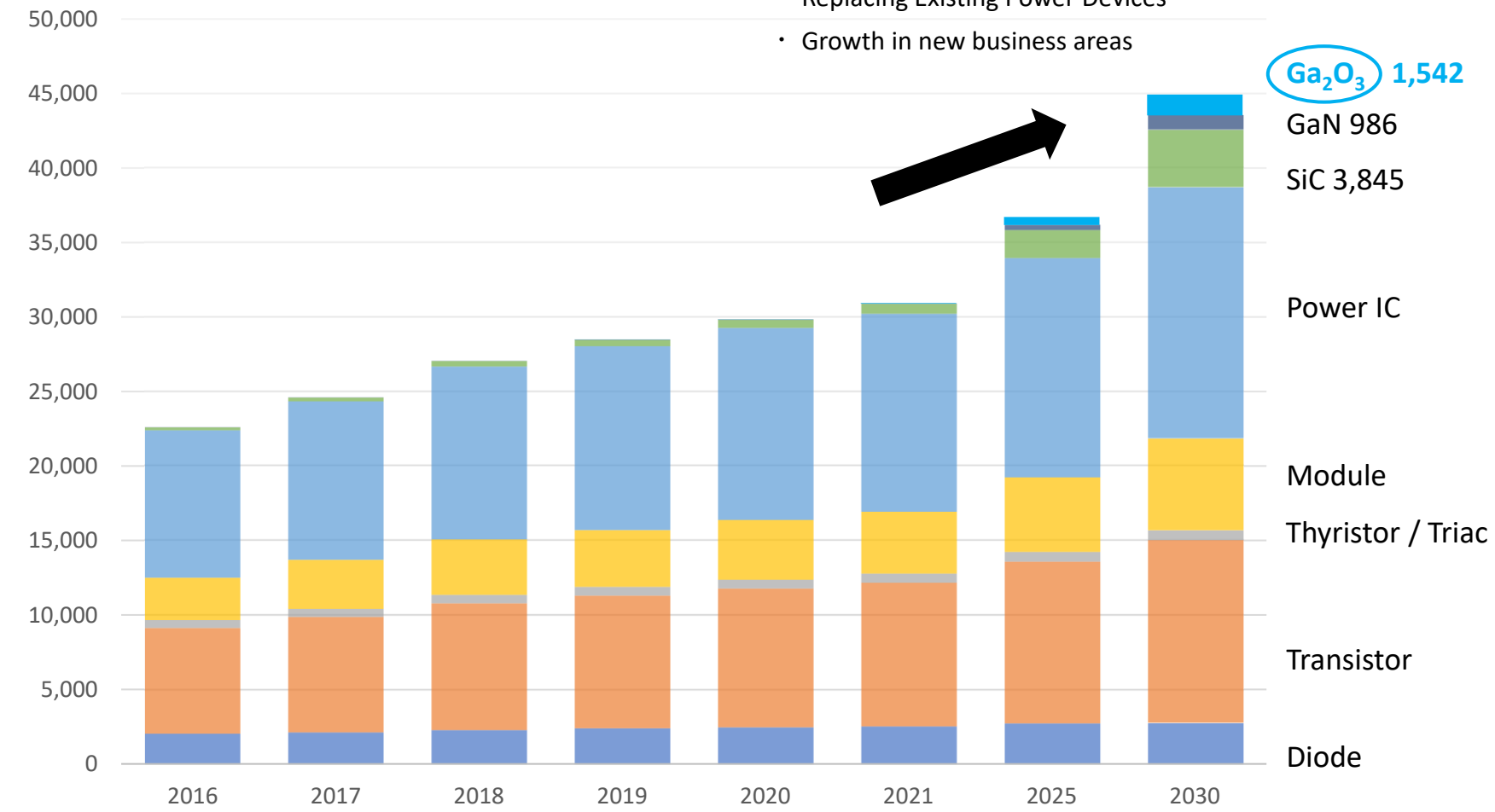
- High Performance
- Energy Saving
- Low Cost

Growing Power Device Markets and Growing Expectations for GaO™ Power Devices

[Global Market Size Projection]

Rise of gallium oxide power devices

- Replacing Existing Power Devices
- Growth in new business areas



Source: Fuji Economy "Current status and future of the market for Next-Generation Power Devices and Power Electronics-Related equipment" in 2018 edition.

2. GaO™ Power Device Key Advantages

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Achieve Ultra-Low Loss and Low Cost with new material innovation
Corundum-Type Gallium Oxide

	Existing material Si	Other materials SiC	New materials α-Ga_2O_3
Material			 FLOSFIA
Loss	**High loss**	**Low-loss**	**Ultra-Low Loss**
	Bandgap: **1.1eV**	Bandgap: **3.3eV**	Bandgap: **5.3eV** — Advantages of Material Properties
	Baluga figure of merit ($\varepsilon\mu E_c^3$): **1**	Baluga figure of merit ($\varepsilon\mu E_c^3$): **340**	Baluga figure of merit ($\varepsilon\mu E_c^3$): **6,726 (estimated)** — Higher value, Low loss!
Cost	**Low cost**	**High cost**	**Low Cost** — Know-how advantage
	Si exponential comparison: **1**	**10**	**1 or less** — Reducing costs through original approach!
Technology & Business Stage	**Monopolize the market** **Mature process technology**	**No progress of market introduction due to high cost**	**No one could have ever manufactured single crystals**

World's First Mass Production of Gallium Oxide Power Device

New material found by Kyoto University

"α-gallium Ga_2O_3 (gallium oxide)"

Large Implementation Hurdle but Low Attention

"No proof data on semiconductor characteristics"

"No device verification data"

"p-type semiconductors are difficult to achieve."

"Thermal conductivity is poor and difficult to use."

FLOSFIA All Clear !

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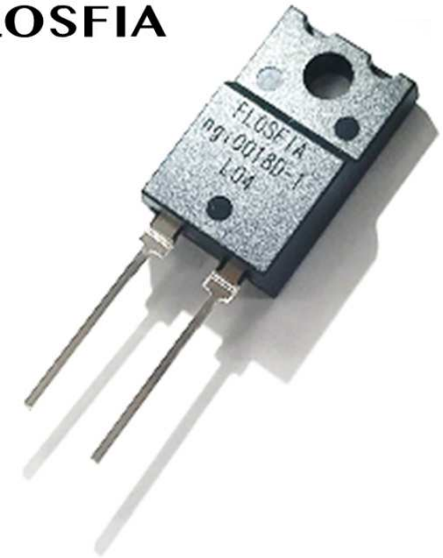

For the first time in the world

corundum-type Gallium Oxide Power Device

- Utilize sapphire substrate commoditized in use in LEDs
- Discovery and utilization of new p-type semiconductors for breakthrough

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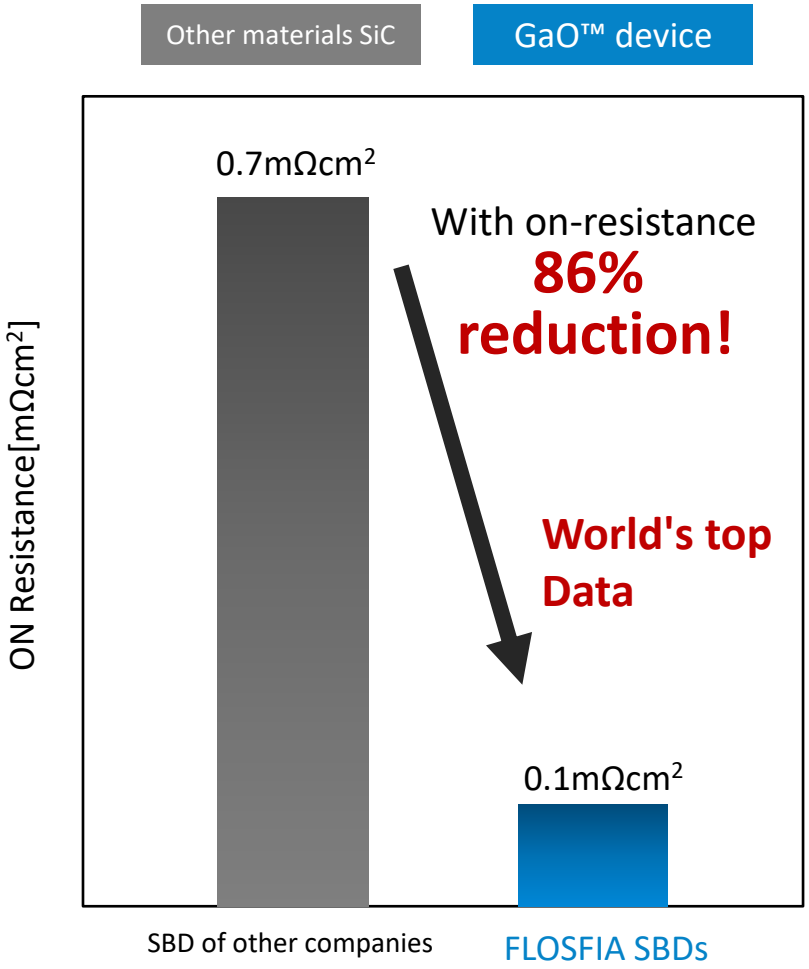
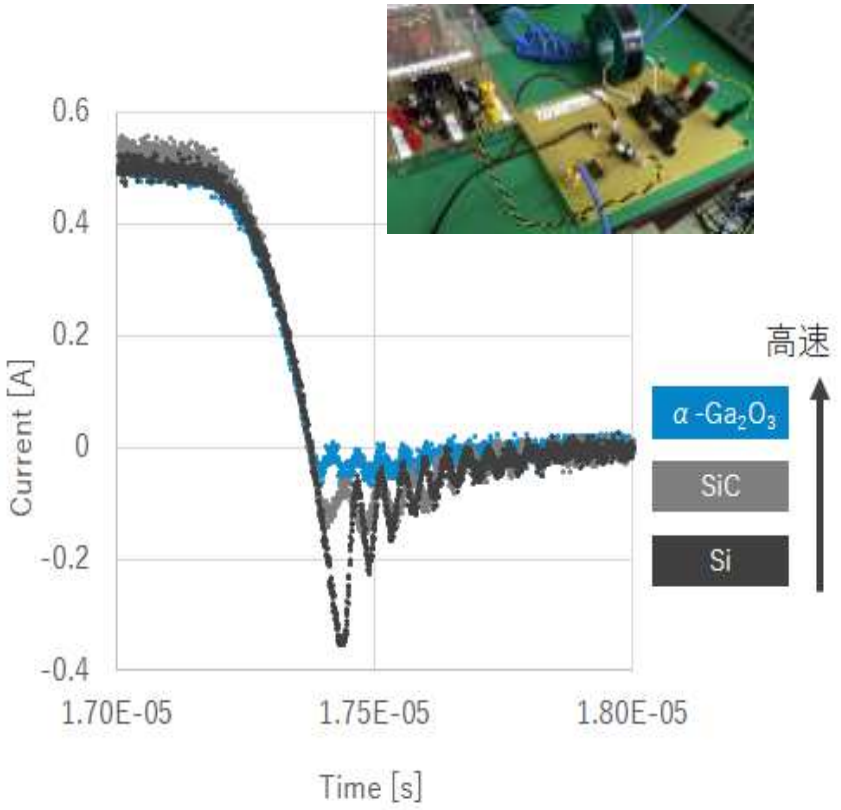
Achieve "Ultra-Low Loss" at Product Level

Low - temperature resistance



High frequency property

Fast switching confirmed!

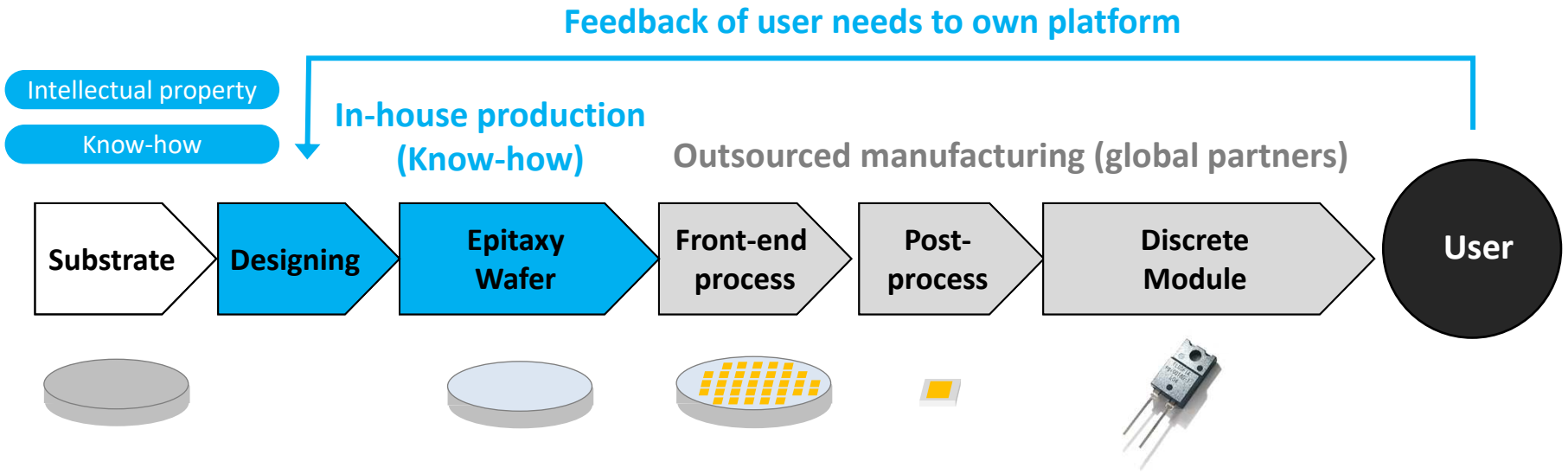


Semi-Fabless Model for Vertical Business Launch with Optimal Investment

Semi-Fabless

Key Strength

- Focus on Core Technology
- Fully utilize external experienced partners
- High Flexibility against market needs and demand fluctuation



Powerful IP Portfolio
to Support Unique Business Model and Prevent New Entry

Focus on acquiring IP(intellectual property)

- **Over 300 patent applications**
- About 100 patents have already been granted

Point 1 **Strong basic patents (material patents) obtained**

Point 2 **Patents reinforced by a wide range of peripheral patents**

Point 3 **Worldwide patent portfolio**


平成31年度 知的財産権制度活用優良企業等表彰

知財功労賞　経済産業大臣表彰

知財活用ベンチャー

株式会社FLOSFIA

代表取締役社長　人羅　俊実

会社概要

http://flosfia.com/

所在地　京都府京都市西京区御陵大原1-29
設立　2011年
資本金　2,710百万円(資本準備金含む)
従業員　50人
事業内容　酸化ガリウムパワーデバイスの開発・製造、独自技術ミストドライによる薄膜の製造

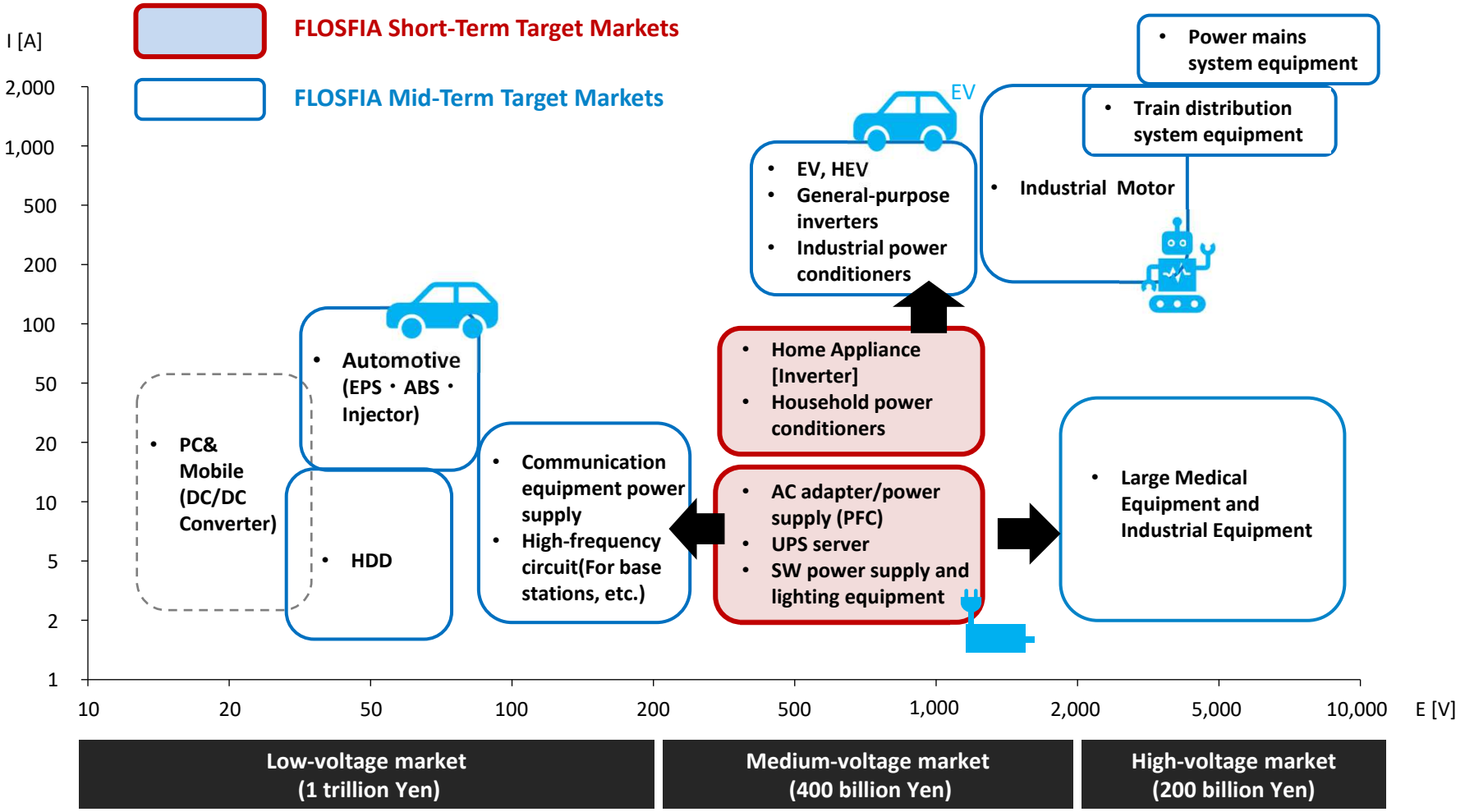
受賞のポイント

- 京都大学発のベンチャー企業であり、世界を一変させる日本発の画期的半導体として注目され、低コスト・小型化・高性能を実現し得る酸化ガリウム系パワーデバイスと、ミストドライ法(ミストCVD成膜法)による成膜ソリューションは、大手企業向けのビジネス展開となることから、事業プランと連携した綿密な知財戦略を構築している。
- 知的財産部長に加え、弁理士試験合格者、米国出願経験豊富な実務経験者の3名体制で、知財戦略の設計から出願・登録に至るまでの全ての業務を内製化して、国内特許事務所を活用せずに実施している。また、自社技術に精通した者が明細書を作成するため、良質な出願書類を効率的に作成できている。基本特許を含め積極的に権利化しており、株式公開前に国内外の特許登録件数を100件以上にする予定である。
- パテントマップを作成して事業戦略の検討に利用している。俯瞰図を作成し、他のベンチャー企業や海外企業の動向を注視しつつ対応するとともに、特許情報を分析し、技術的な相乗効果を生むパートナー候補企業を抽出し、異分野連携に活用している。また、海外市場も視野に入れており、欧州、米国、中国、韓国、台湾等への海外出願も行った上で、営業活動を実施しており、国内外から、サンプル提供の依頼、出資や事業提携の話などが寄せられている。

ミストドライ法　GaOデバイス　展示会でのFLOSFIA展示ブース

Received the Minister of Economy, Trade and Industry Award as an excellent company actively using intellectual property right system

Business Expansion from Medium-Voltage Market to High-Voltage & Low Voltage and Establish World Standard!



Development of Transistor (MOSFET) as Next Pipeline for Continuous Growth

~ 2016
Establishment of basic technology by SBD prototype

2016
Invention of a novel p-type semiconductor
(Development of P layer by α-type iridium oxide)

2018
MOSFET Operation Verification Successed
(Normally Off)

2018
Adoption of national projects
(Cabinet Office SIP)

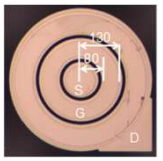
2021
MOSFET Commercialization

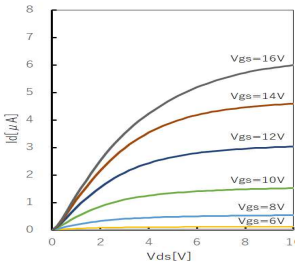
Patent application

Material breakthroughs
(Joint research with Kyoto University)

Patent application

Successful demonstration of concept at device level





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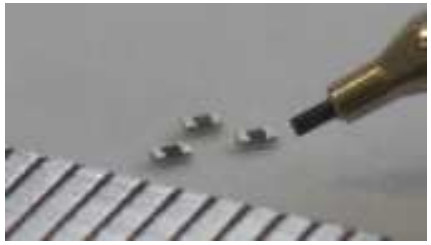
Building Unique Platform Utilizing MIST Technologies

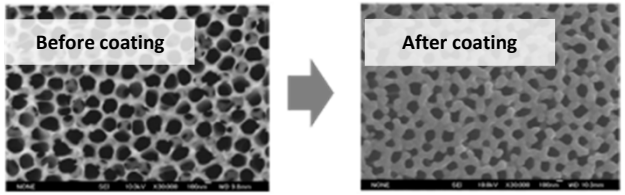
Platform for Film Deposition Synthesis Technology by using MIST DRY™ method

Thermistors

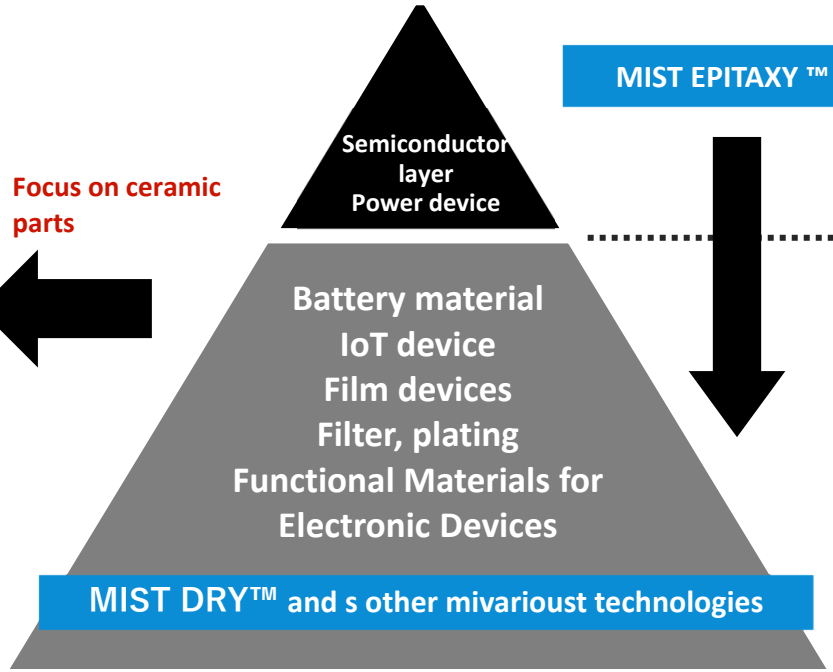


Start of sample shipment!

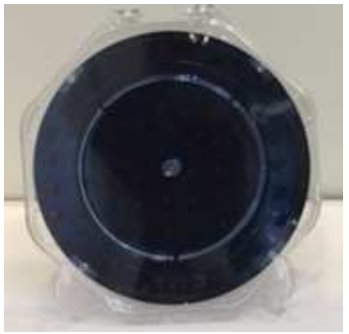
Fuel cell separator



Focus on ceramic parts



Film formation on wafers (Larger diameter)



8inches

Rhodium plating on polyimide

Gold plating on 4inch wafers

Utilizing the flow of knowledge and know-how, Contributing to Human Development

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Companies gathered flow from various kinds of sophia,
I would like to further refine this sophia and flow it to contribute to the progress of humans.
We have named this type of shape we aim at 'FLOSFIA' ..etc....
Thank you for being utilized in the world and being connected with the world, learn and grow in it, and as a existence that will well satisfy the community and society.
We hope that it will connect again.