JFCA
Japan Fine Ceramics Association

Welcome!

Japan Fine Ceramics Association (JFCA)

JFCA
Japan Fine Ceramics Association

About Us

Japan Fine Ceramics Association (JFCA)

Japan Fine Ceramics Association (JFCA)

- Since its foundation in November 1986, Japan Fine Ceramics Association (JFCA) is an organization with a mission to promote the development of the fine ceramics industry.
- In order to utilize the most advanced technologies of fine ceramics, it requires multiple collaboration of manufacturers, users, universities and research laboratories, together with the fusion of other materials.
- The members of Japan Fine Ceramics Association include a diversity of industries such as; Ceramics, Chemicals, Metals, Automobiles, Electronics, Power supply and Service.
- Through various activities, JFCA brings together and promotes cooperation among government, industry and academia for the further development of the fine ceramics industry.

Greetings From the Chair

The Japan Fine Ceramics Association, which will soon celebrate its 40th anniversary, aims to promote the fine ceramics industry and has collaborated with international organizations, government agencies, academia, etc. to disseminate "ceramic solutions" to the world.

Going forward, we will continue to expand our activities globally and aim for further market expansion based on three policies: 1) Leading the world standards and rules, 2) Leading the world market, and 3) Leading the materials developments.

With the guidance of the Ministry of Economy, Trade and Industry and related ministries and organizations, we will do our best to realize the fine ceramics industry that contributes even more than ever to the progress and prosperity of human society.

Goro Yamaguchi
Chair of the Board and
Representative Director,
KYOCERA Corporation

Outline of Activities

1. Collection and Supply of Information on the Fine Ceramics Industry

Publication of Association's "FC Report (Japanese only)" and this industry's only comprehensive statistics "SANGYODOKOCHOSA (Sales trend survey)". Supplying information on the internet website and arranging lectures on the latest management and technologies.

2. Exchange of Information and Meetings

Introducing new products and technologies at the "International Ceramics Exhibition" and "Techno-festa". Conducting field trips to various companies and organizations. Arranging seminars on topics regarding to the needs of the JFCA members. (Such as technology, market trends, and regulatory measures etc.)

JFCA Techno-Festa

3. Survey and Research for the Industry

Conduct surveys and research to clarify the needs of the industry to suggest and support the government's industrial strategy and development project.

Outline of Activities

4. Research and Development of Standards

Establishing the evaluation technology for fine ceramics, including Photocatalysis and Bioceramics. Preparation of the draft for standardization.

5. Promotion of International Cooperation

Survey and research on fine ceramics industries overseas. Attending international symposiums. Gathering foreign information.

6. Awarding of the Japan Fine Ceramics Association's Prize

JFCA awards individuals, corporations and organizations who have distinguished achievement in the field of fine ceramics.

JFCA Awards Ceremony

Outline of Activities

Lead
Standards Development

-ISO/TC206(FC) Secretary
-ISO/TC150(Surgical Implants)/ SC7 Secretary

Lead
the Market

-Information Gathering & Sharing
-Market Trends Survey
-International Fairs

Lead
Materials Development

-National R&D Projects
-Prompting Product Innovation
-Industry-Government-Academia
-Cooperation -Association Awards

USACA — **US Advanced Ceramics Association**

The American Ceramic Society

MOU

Japan Fine Ceramics Association

JFCA

- Secretariat of ISO/TC206&150 National Committee
- Secretariat of Advanced Coating Alliance
- Secretariat of CMC Consortium
- Ceramic 3D Printing Study Group
- Digital Lab Study Group

Member Companies

Raw Materials	Users
Manufacturing	Services

Industry Association

MOU

Pôle Européen de la Céramique (PEC)

Academia & Research Institutes

- More than 50 universities nationwide
- National research institutes (AIST, NIMS, JAXA, etc.)
- Non-profit research institutes (JFCC, etc.)
- Academic societies (CerSJ, etc.)
- Others

Government Agencies

- Ministry of Economy, Trade & Industry (METI)
- Ministry of Education, Culture, Sports, Science & Technology (MEXT)
- Ministry of Health, Labor & Welfare
- Ministry of Defense
- Ministry of the Environment
- Cabinet Office
- New Energy & Industrial Technology Development Organization (NEDO)
- Japan Science and Technology Agency (JST)
- Japan Agency for Medical Research & Development (AMED)
- Others

JFCA Structure

General Assembly

Bord of Directors

Auditors

Board Com

- Administration
- Plan-Interaction
- Standardization
- Editorial
- Industry-Trend
- Awards
- Sustainability

Inter. Std. Com

- Power Electronics
- 3D Medical
- GaN
- Coating
- Bio-ceramics
- Electrical Properties
- White LED
- Thermal Energy
- SOFC

Contract Survey Com

- High-Power Laser
- CMC International R&D
- Market Trend Survey

Ceramic Japan Expo

Consortium & Study Group

- CMC Consortium
- Advanced Coating Alliance
- Ceramic 3D Printing Study Group
- Digital Lab Study Group
- Opto-Ceramics Study Group

International Cooperation

- ISO TC150 (Tissue-Eng Medical Products)
- ISO TC206 (Fine Ceramics)
- US Advanced Ceramics Association (USACA)
- European Ceramics Center (PEC)
- American Ceramic Society (ACerS)
- China-Japan-Korea Standardization Secretary Council

JFCA Membership and History

Membership: 130 (Companies, Universities, Research Institutions, etc.)

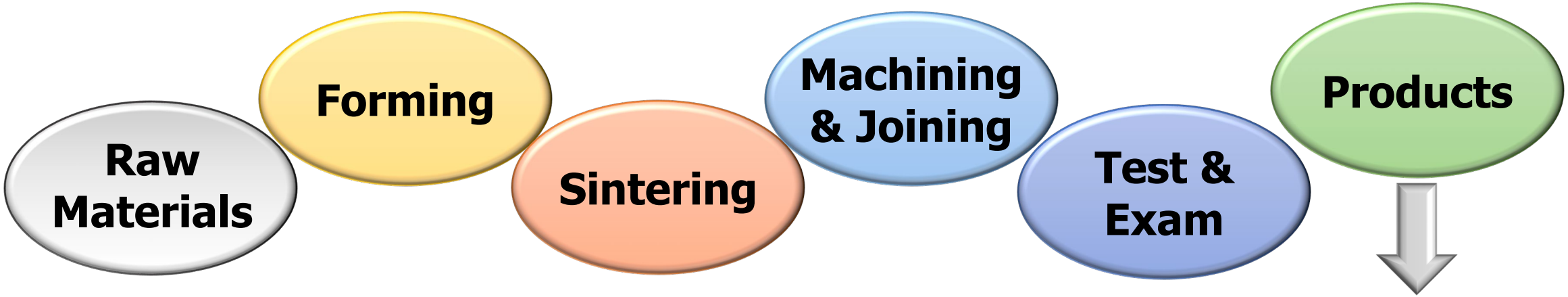
History:

- 1982: Established as Fine Ceramics Association
- 1986: Reorganized as Japan Fine Ceramics Association (JFCA)
- 1992: ISO/TC206 (Fine Ceramics) Secretariat
- 2001: Commendation from the Minister of Economy, Trade and Industry
- 2007: ISO/TC150/SC7 (Tissue-Engineered Medical Products) Secretariat
- 2015: MOU with United States Advanced Ceramics Association (USACA)
- 2016: MOU with European Ceramics Center (PEC)
- 2021: Published FC Roadmap 2050
- 2023: MOU with The American Ceramic Society (ACerS)

JFCA 30th Anniversary Ceremony

JFCA Membership

Supply Chain of Fine Ceramics



- **JFCA members include a diversity of industries**
- Through various activities, JFCA brings together and promotes cooperation among government, industry and academia for further development of fine-ceramics industry.

What is “Fine Ceramics”?

- According to ISO 20507, Fine Ceramics are "produced with precisely controlled chemical compositions, microstructures, configurations and production processes to fulfill intended functions, and are composed mainly of non-metallic, inorganic substances.
- The term "Fine Ceramics“, which came into common use in the 1970s, was coined by Dr. Kazuo Inamori, the Founder of KYOCERA Corporation.
- Dr. Inamori maintained that "unlike conventional ceramics, Fine Ceramics possess high added-value in industrial applications. Their value should not be measured based on volume and they must be 'fine' both physically and structurally."
  (“Prefatory note, Fine Ceramics”, *Bull. Ceram. Soc. Japan*, 8 (1973) 19-20.)
  https://global.kyocera.com/fcworld/first/about.html

Dr. Kazuo Inamori
Founder,
KYOCERA Corporation
(Founder of KDDI and Honorary Adviser of Japan Airlines)

JFCA
Japan Fine Ceramics Association

Our Philosophy

Japan Fine Ceramics Association (JFCA)

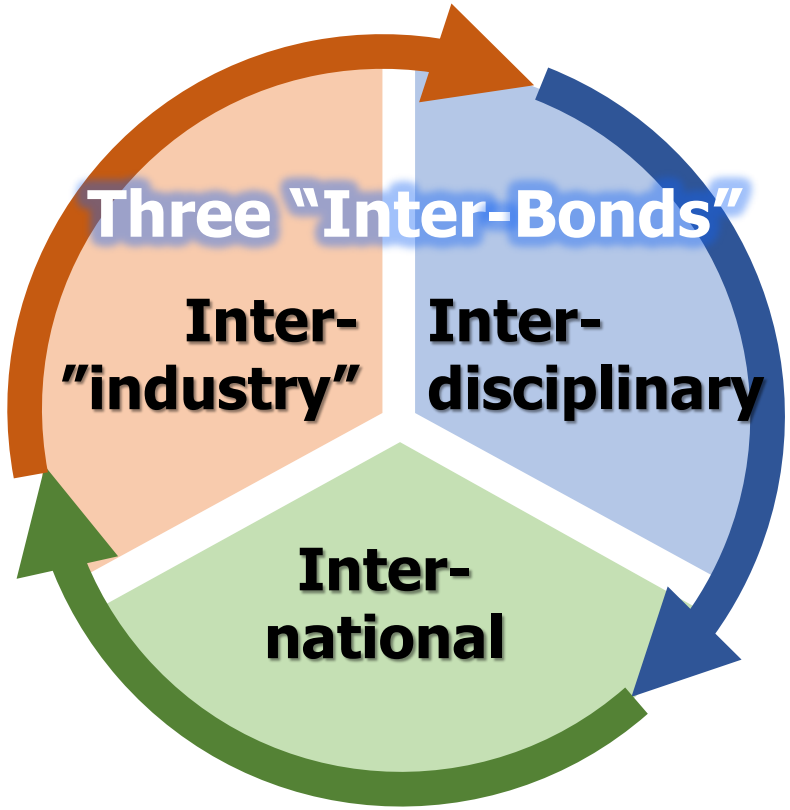
Japan Fine Ceramics Association (JFCA)

We value "Three "Inter-Bonds"

Inter-"industry": Members widely ranging in various industry fields, including, not only ceramics, but also automobiles, aerospace, electronics, energy, medical, machinery, chemicals, and others.

Interdisciplinary: Address all sorts of technical areas related to fine ceramics, from structural components to electronics devices and optical applications.

International: Serving ISO/TC206 (Fine Ceramics) as Secretariat since 1992. Global ceramic alliance with overseas organizations.

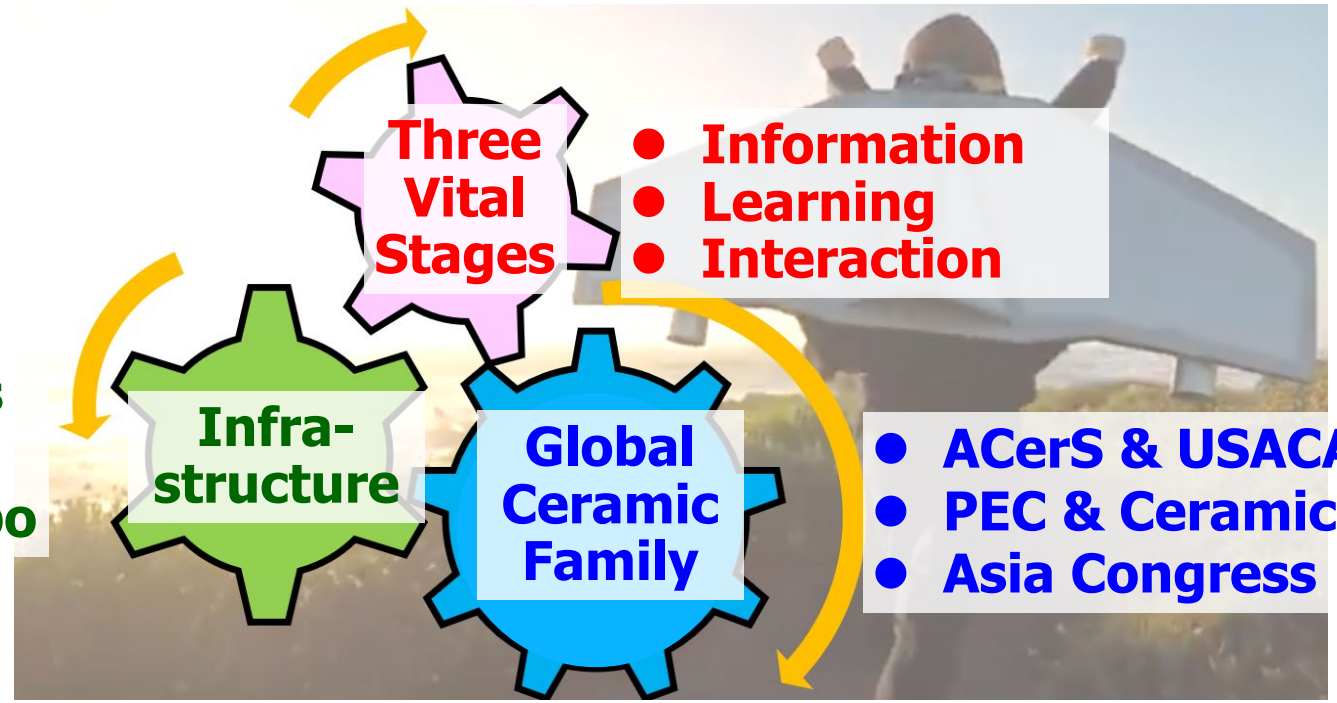


With an eye on the expanding global market, we strive to be an organization our members can count on.

Wide Range of Services for Members

JFCA, together with the global ceramics family, provides a network platform for ceramics-based solutions in society and ensures progress and prosperity of the ceramic industry. We work with governments, universities/research institutes and other industrial associations both domestically and internationally, to improve the member service and to contribute to the sustainable development of human society, through international standardization, R&D promotion, etc.

- International STDs
- R&D promotion
- Ceramic Japan Expo

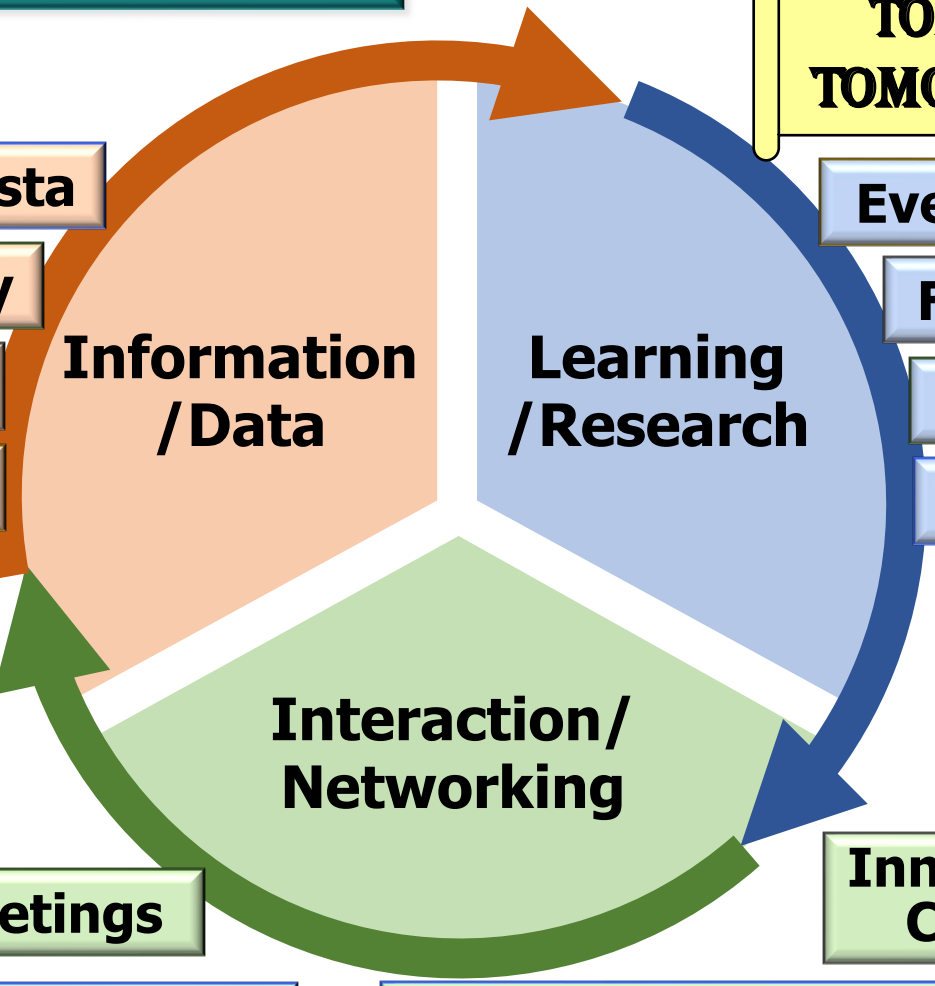


Three Vital Stages

Information → Learning → Interaction

NOTHING COMES FROM NOTHING.

- Techno-Festa
- Tech Trend Survey
- Members Only WEB
- Petition to Government



TODAY A READER. TOMORROW A LEADER.

- Evening Seminar
- Factory Tour
- Study Camp
- Overseas Survey

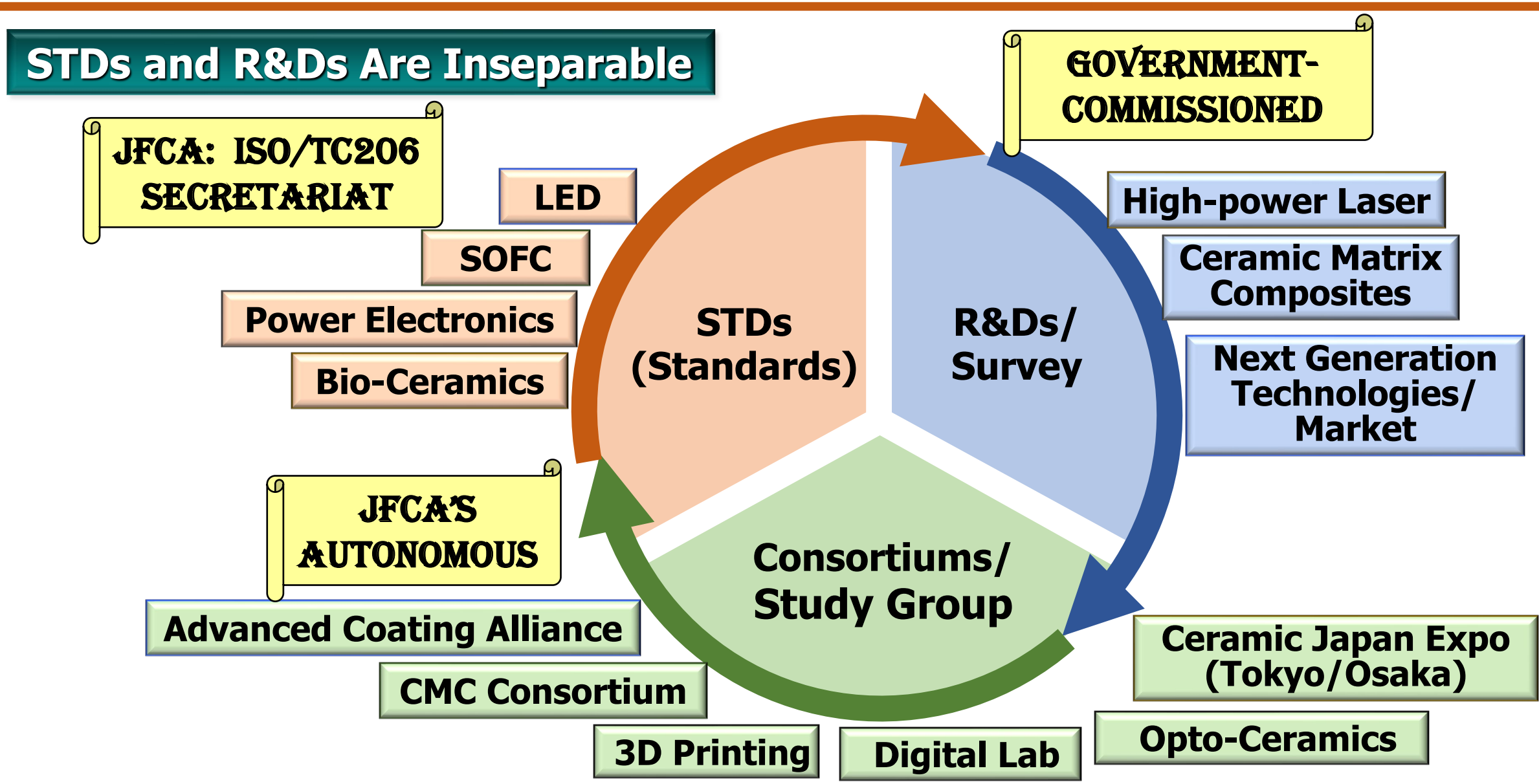
ceramics expo
Ceramitec

TWO HEADS ARE BETTER THAN ONE

- Public Meetings
- Committee Exchange

- Innovation Seminar/ Ceramic Evening
- Techno Festa/New Year's Gathering

Infrastructures

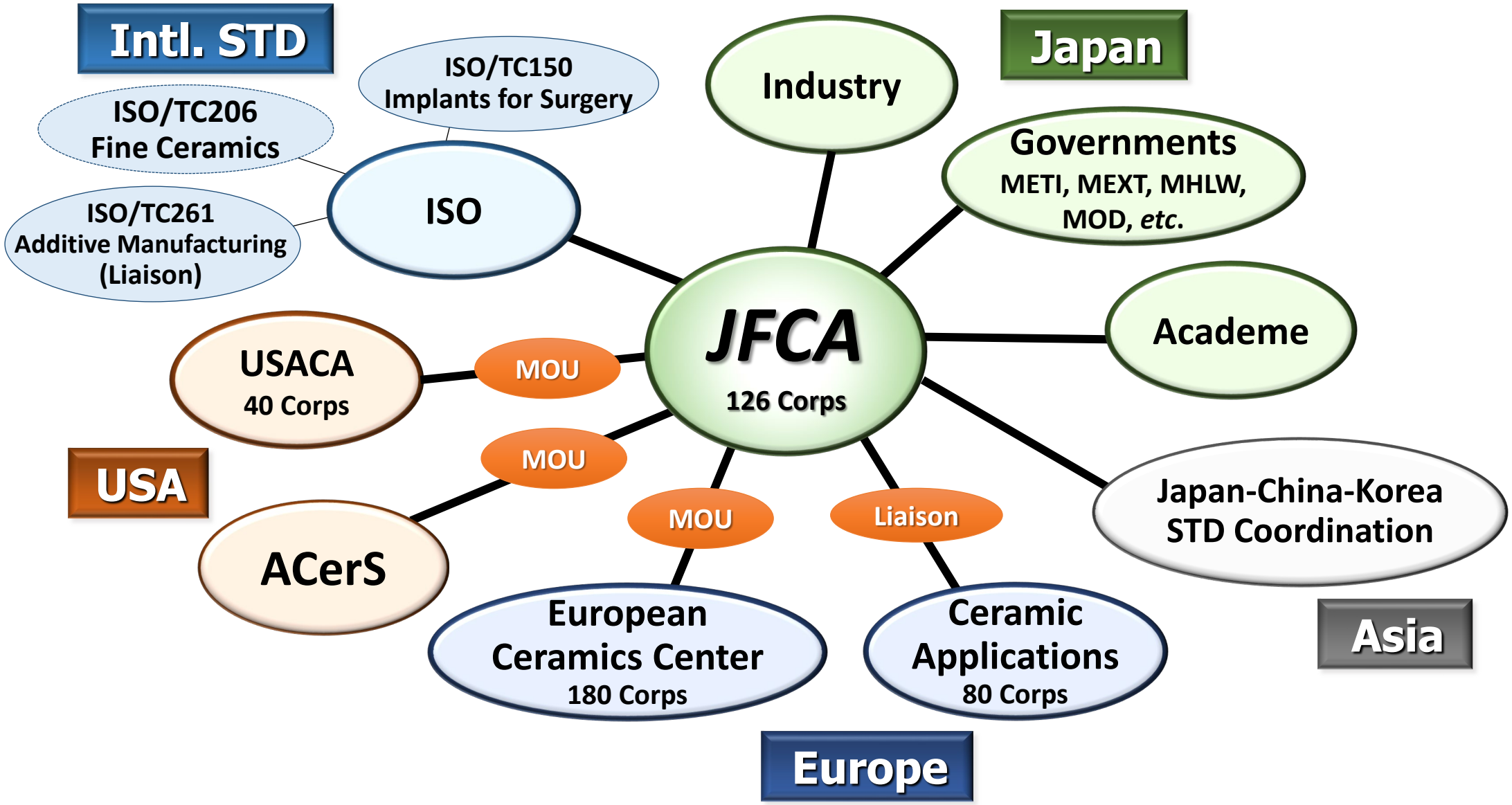


JFCA
Japan Fine Ceramics Association

Our Networks and Alliances

Japan Fine Ceramics Association (JFCA)

Global & Domestic Network



MOU with ACerS

ACerS-JFCA MOU Commemorative Plaque

ACerS signs MOU with Japan Fine Ceramics Association

The Society signed a three-year renewable memorandum of understanding with the Japan Fine Ceramics Association (JFCA). JFCA's mission is to promote development of the fine (advanced) ceramics industry by bringing together stakeholders across government, industry, and academia.

"JFCA's mission and ours align well, and the Society welcomes the opportunity to partner with JFCA for the good of the global advanced ceramics industry," says Mark Mecklenborg, ACerS executive director.

The MOU opens a pathway for the organizations to promote each other's meetings, exhibitions, and publications to their respective global memberships. In the future, new joint initiatives may be developed.

JFCA recently published "FC Roadmap 2050," a technology and market roadmap for fine ceramics through 2050. The publication presents 27 roadmaps in nine sectors: mobility, telecommunications, medical care and welfare, energy, infrastructure, environment, sensor, battery, and semiconductor materials and devices. Learn more at https://ceramics.org/fineceramicroadmap2050. ■

American Ceramic Society Bulletin 102 (4), 9 (2023)

Global Ceramic Alliances

JFCA Japan Fine Ceramics Association

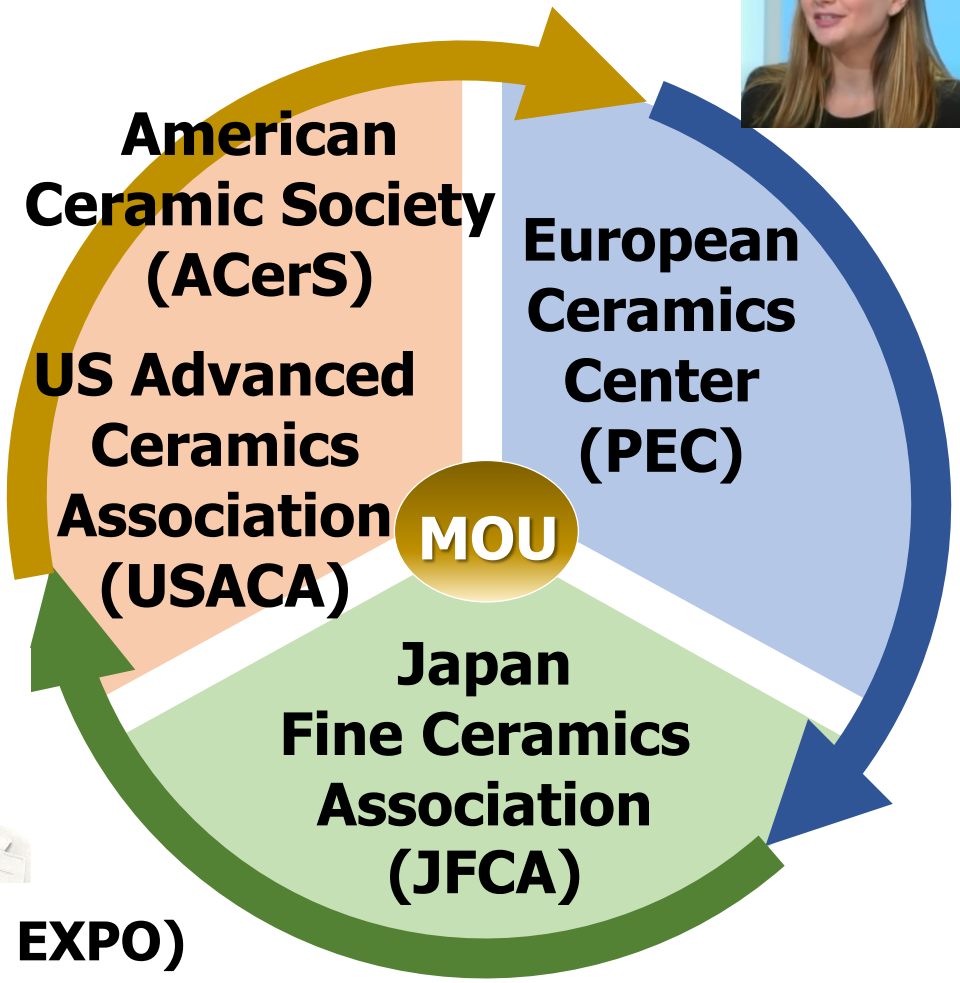
Mark Mecklenborg
ACerS Executive Director

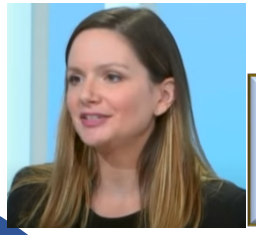
Ken Wetzel
USACA Executive Director

ceramics expo **(US EXPO)**

Tomosaburo Yano
Executive Director

CERAMIC JAPAN — Highly-functional Ceramic Expo — **(Japan EXPO)**





Florine Boulle
Directrice Générale

Ceramitec **(Europe EXPO)**

CERAMIC APPLICATIONS **(Germany, Aligned)**

Ulrich Werr
Editor

Asia Council (tentative name)

JFCA
Japan Fine Ceramics Association

Ceramic Industry in Japan and the World

Japan Fine Ceramics Association (JFCA)

Importance of Ceramic Research

Japanese Government issued

- **2021: "Strategic Plan for Materials Innovation"**
- **2021: "6th Science and Technology/ Innovation Basic Plan"**

Emphasizing importance of materials research in coming years

Reason 1: Materials are key for our future

Particularly, because of unique material properties, advanced ceramics are expected to greatly contribute to solution of the global issues we are facing.

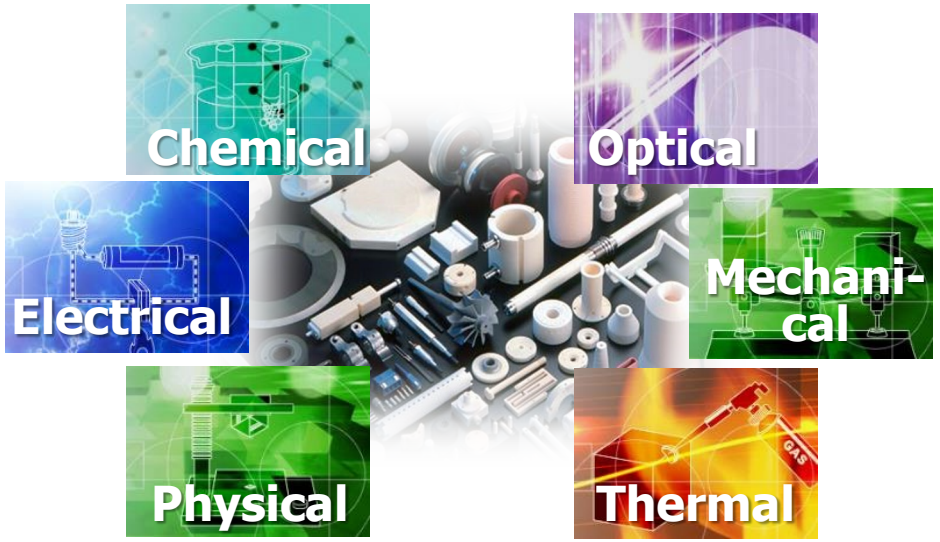
Global Issues

Global Warming

Energy/Environment

Safety/Security

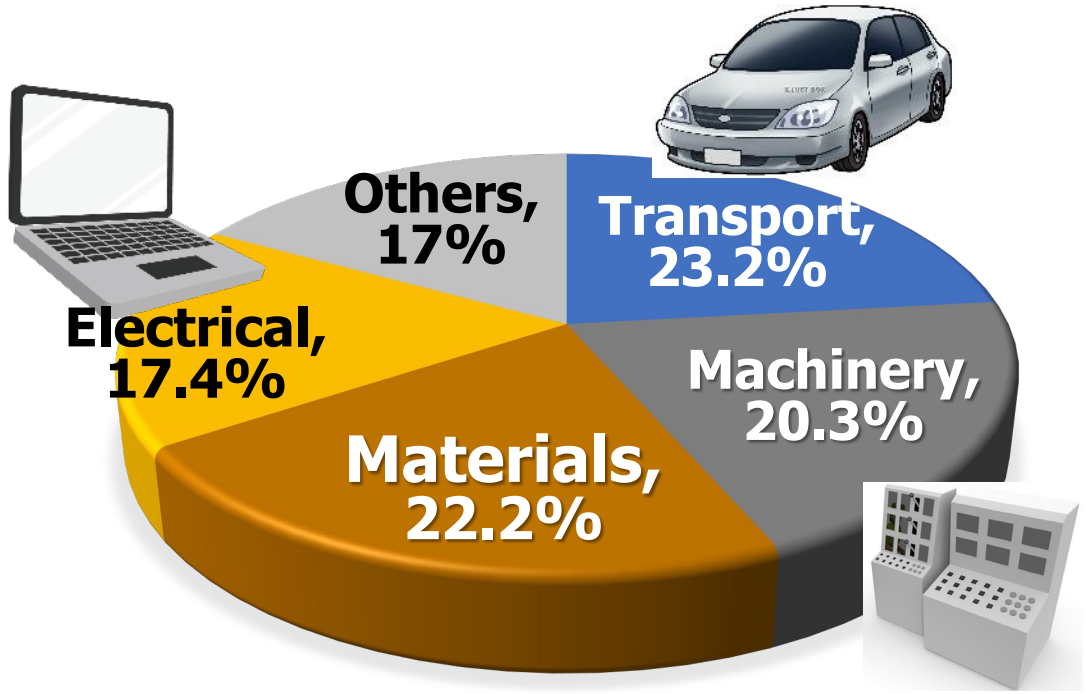
Foods/Water



Importance of Ceramic Research

Reason 2: Materials are Japan's strength

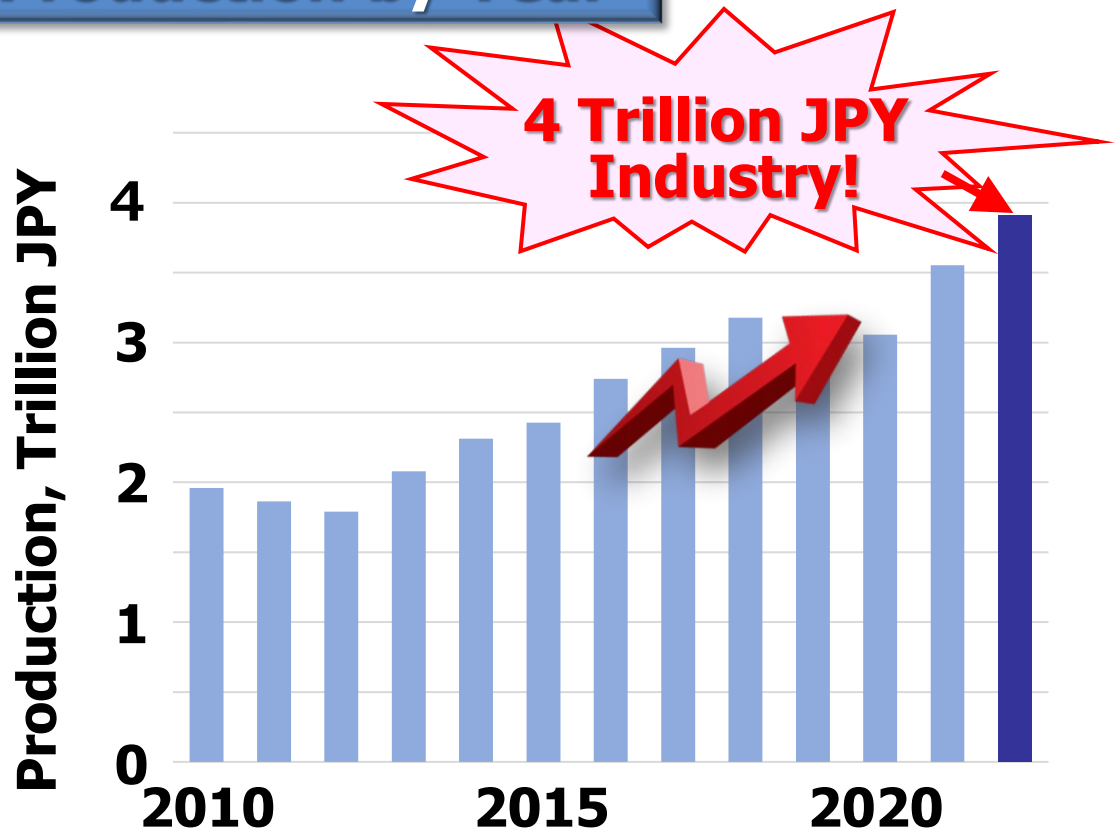
- More than 20% of the total export is "materials-related" (equivalent to transport).
- Materials are also essential for innovation of other products (transport, machinery, electrical, *etc.*), which account for most of Japan's export.
- Many types of materials where Japan's production is a majority of the world market.
- Advanced ceramics are one of the most typical examples.



Breakdown of Japan's export (2018)

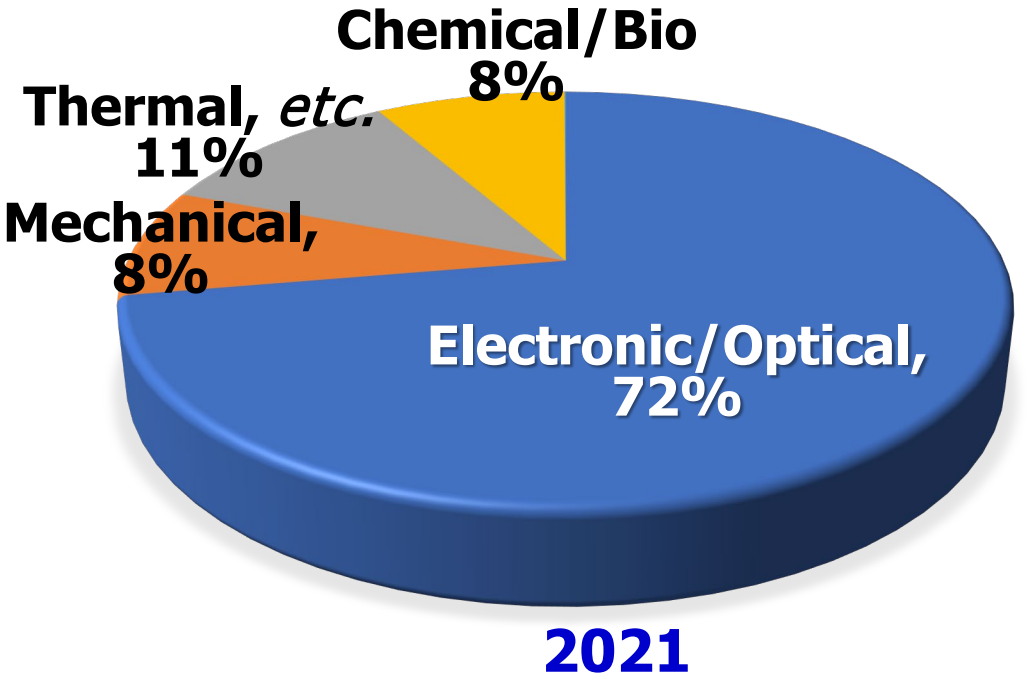
Fine Ceramics Production in Japan

Production by Year



- Continuously growing!
- Production is ~4 trillion JPY in 2022.

Production by Category

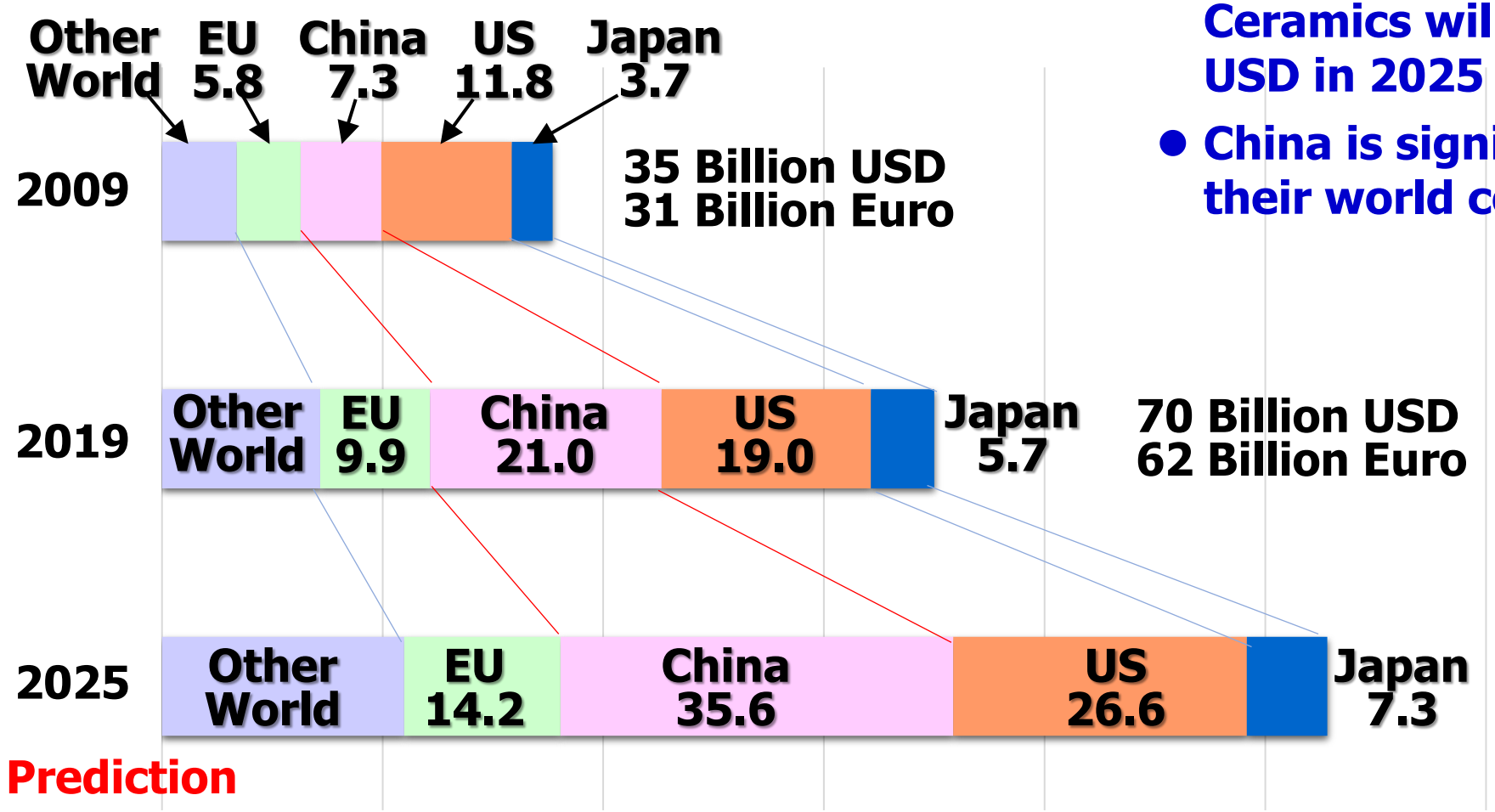


- Electronic/optical accounts for >70% in 2021, due to strong demand of semi-conductors, *etc.*

"Industry Trend Investigation 2021", JFCA

Expanding World Market

Consumer Market Share, Billion USD

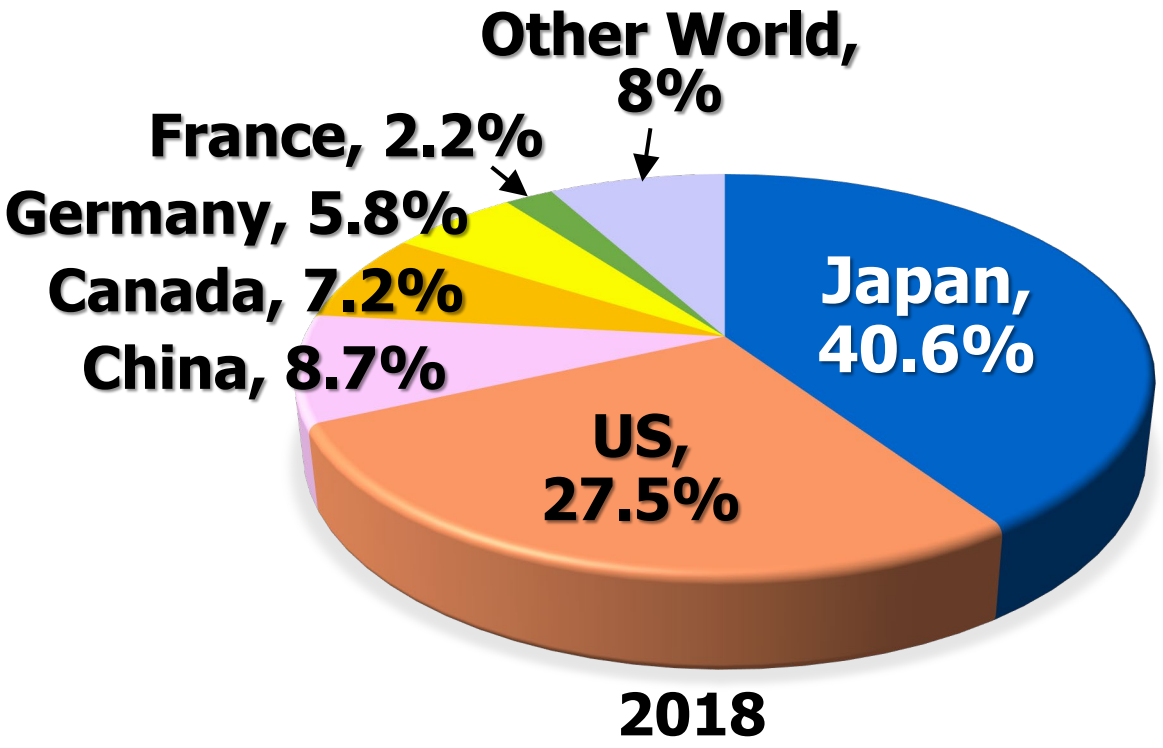


- The world market of Advanced Ceramics will exceed 100 Billion USD in 2025
- China is significantly increasing their world consumer share.

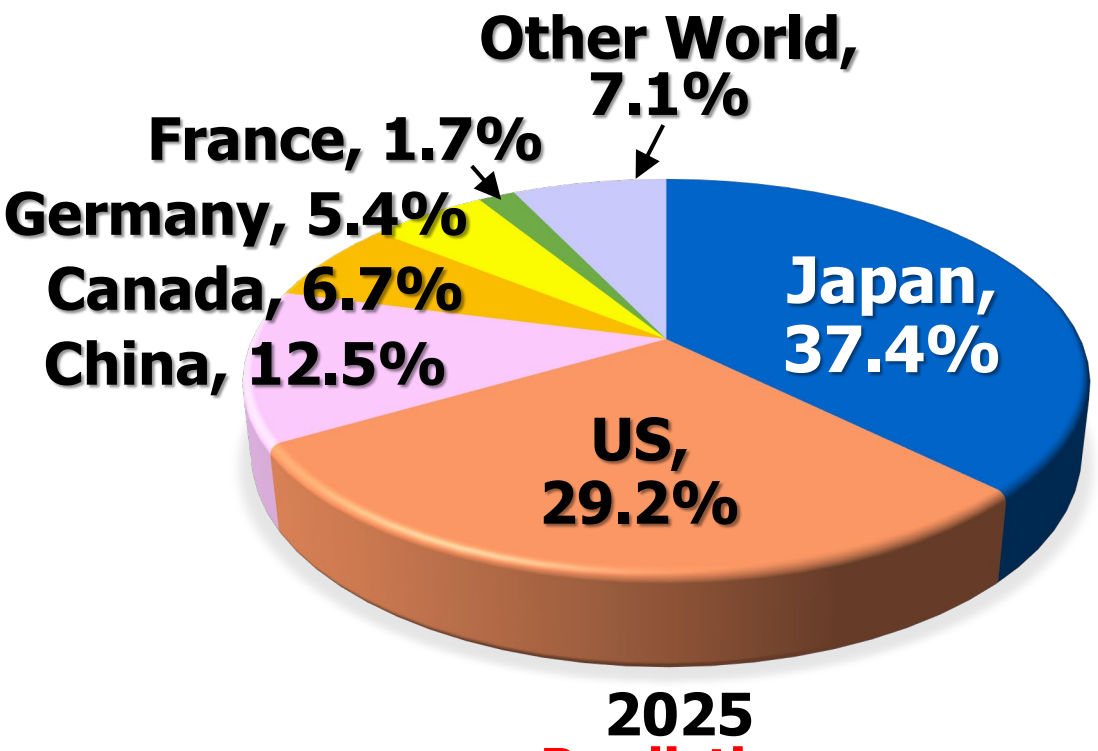
"Advanced Ceramics Market Analysis, Trends and Forecast 2020", Global Industry Analysis Inc.

Expanding World Market

Producer Market Share, %



2018



2025
Prediction

- Japan's world producer share is ~40% but is slightly decreasing.

"Advanced Ceramics Market Analysis, Trends and Forecast 2020", Global Industry Analysis Inc.

JFCA
Japan Fine Ceramics Association

Standardization Activities

Japan Fine Ceramics Association (JFCA)

ISO/TC 206
Fine ceramics

About

Secretariat: JISC

Committee Manager: Dr Hiroyuki Miyazaki

Chairperson (until end 2023): Prof Heesoo Lee

ISO Technical Programme Manager [TPM]: Ms Yan Cui
ISO Editorial Manager [EM]: Mr David Reid

Creation date: 1992

As of Dec. 2023

155
Published ISO standards *

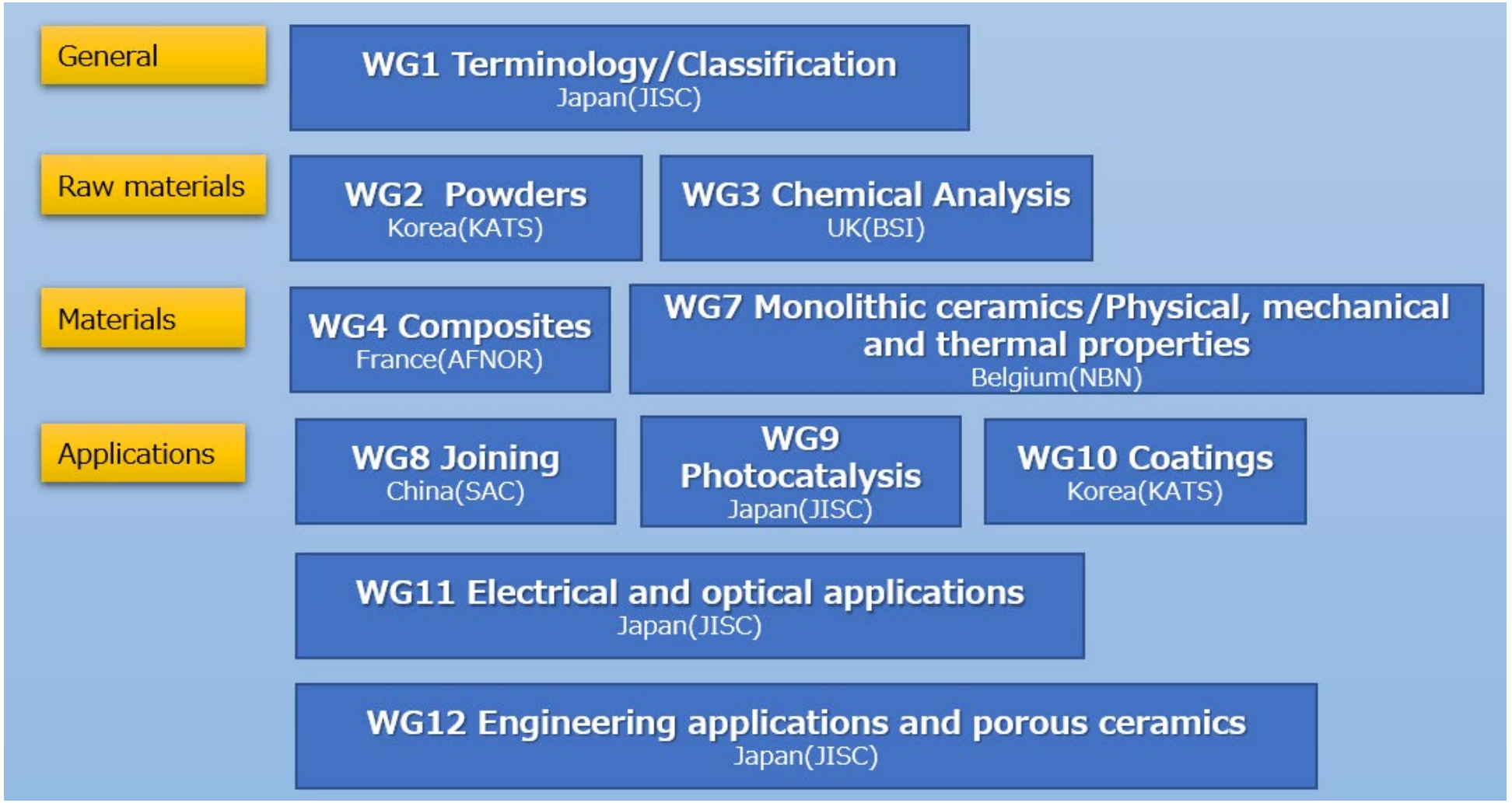
30
ISO standards under development *

13
Participating members

22
Observing members

ISO TC206 Fine Ceramics

Committee Structure



ISO/TC 150
Implants for surgery

About

Secretariat: DIN

Committee Manager: Mr Klaus Zeier

Chairperson (until end 2025): Mr Hany Demian

ISO Technical Programme Manager [TPM]: Mme Patricia Cook
ISO Editorial Manager [EM]: Ms Sanjali Jain

Creation date: 1971

As of Dec. 2023

175
Published ISO standards *
of which 17 under the direct responsibility of ISO/TC 150

42
ISO standards under development *
of which 4 under the direct responsibility of ISO/TC 150

24
Participating members

22
Observing members

30th ISO TC206 General Meetings

Since its establishment in 1992, ISO/TC206 has held the 1st, 10th, 20th, and 30th General Meetings in Japan. The 30th one and the precedent WG meetings were hosted Oct 4-6, 2023, at the Heian Shrine Hall in Kyoto. Each WG was held Oct 4 and 5 in a hybrid style, followed by a GALA dinner. The General Meeting was organized Oct 6 in person only, with approximately 80 participants from five countries. We look forwards to meeting you at the future General Meetings.

Picturesque Japanese garden viewed from the Heian Shrine Hall

GALA Dinner Opening Ceremony: Opening a sake barrel using mallets (Japanese tradition)
From L to R, Koyanagi JFCA Intl'. Director, Lee ISO/TC206 Chair, Yamaguchi JFCA Chair (KYOCERA Corp. Chair), and Flavie French delegate (next host)

30th General Meeting surrounded by Japanese garden

JFCA
Japan Fine Ceramics Association

CERAMIC JAPAN

Highly Functional Ceramic Expo!

Japan Fine Ceramics Association (JFCA)

CERAMIC JAPAN

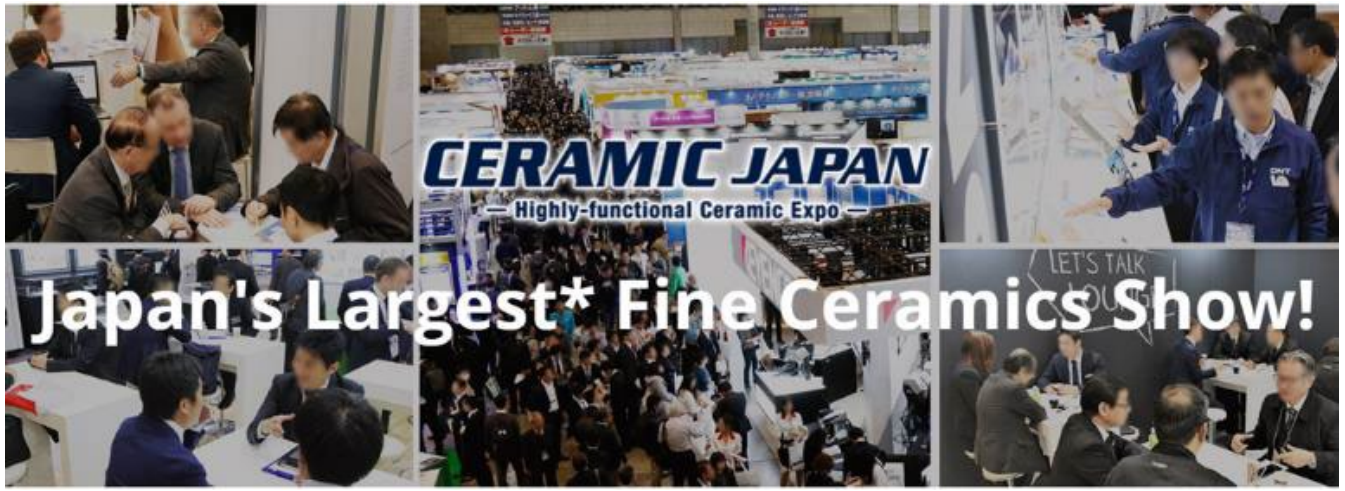
Japan's Largest* Fine Ceramics Show, ***CERAMIC JAPAN*** gathers fine ceramics (structural materials, functional materials, biomaterials, refractories), ceramic raw materials (oxides, phosphors, nitrides, carbides), manufacturing and processing technologies, and more. It is held twice a year in Osaka and Tokyo.

(*"Largest" in reference to the exhibitor number of trade shows with the same concept.)

2024 *Ceramic Japan*

Osaka Show — **May 8 (Wed) - 10 (Fri)**
Intex Osaka, Japan

Tokyo Show — **Oct 29 (Tue) - 31 (Thu)**
Makuhari Messe, Japan



https://www.material-expo.jp/hub/en-gb/exhibit/cera.html

CERAMIC JAPAN

2023 *Ceramic Japan*

JFCA Booth

CMC Consortium Booth

- **Exhibiting the recent activities and latest accomplishments**

JFCA-PEC (European Ceramics Center) MOU 5th Anniversary

at the 8th Ceramic Japan Party, Makuhari Messe, Oct 4-6, 2023

L: Boulle PEC Directrice Générale and
R: Yano JFCA Executive Director

JFCA
Japan Fine Ceramics Association

Activities for Carbon Neutrality

Japan Fine Ceramics Association (JFCA)

Activities for Carbon Neutrality (CN)

- Climate change is a real and undeniable threat to this planet, and efforts toward carbon neutrality (CN) are critically essential.
- This is proclaimed as Sustainable Development Goal 13 (SDG 13), "Take urgent action to combat climate change and its impacts by regulating emissions and promoting developments in renewable energy".
- Towards this goal, JFCA strives for formulating
  - ➢ **JFCA Carbon Neutral (CN) Activity Policy**
  - ➢ **JFCA Carbon Neutral (CN) Vision**

  for the fine ceramics industry, with strengthening collaboration and cooperation among the member companies.

SDG 13:
Climate Action

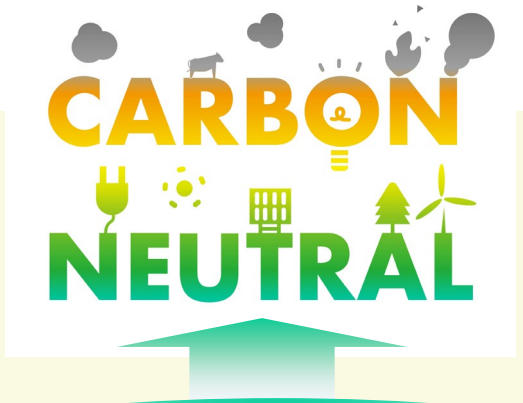
JFCA Carbon Neutral (CN) Activity Policy

- "Through tireless efforts, the fine ceramics industry will strive for reducing GHG emissions in their corporate activities and contributing to carbon-neutrality through their products and services."
- Discussed in JFCA's Sustainability Committee with its GHG Reduction Sub-Committee and CN Contribution Sub-Committee.

JFCA Carbon Neutral (CN) Vision

- **GHG Reduction Vision**: Future vision for strategies to reduce GHG emissions related to corporate activities in the fine ceramics industry, including carbon capture, and achieving CN.
- **CN Contribution Vision**: Future vision for new application and performance of fine ceramic products that contribute to CN.

JFCA Activities Towards CN



Other Industries

Government, National Institutes

Synergistic Activities of Member Companies

Global Interaction

Member Company

Member Company

Academia

Intercorporate Network Platform

JFCA CN Activity Policy

JFCA CN Vision

Sustainability Com

GHG Reduction Sub-Com

CN Contribution Sub-Com

Technical Trend Survey

GHG Reduction Vision

CN Contribution Vision

JFCA
Japan Fine Ceramics Association

FC Roadmap 2050

Japan Fine Ceramics Association (JFCA)

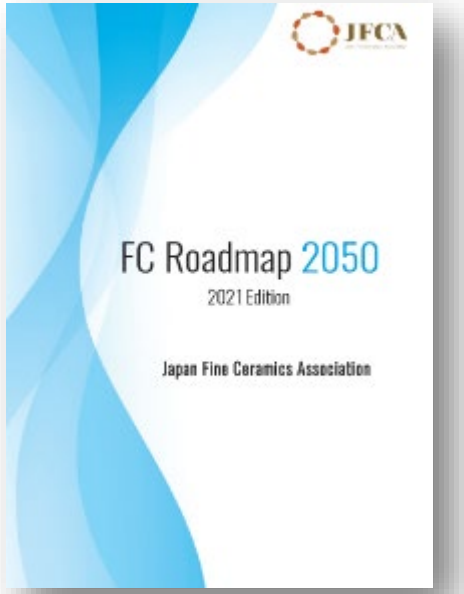
FC Roadmap 2050

2021 Development, 64 Pages, Published March 2022 (English Version)

- Address advanced ceramics technologies and products to be needed in 2050, based on comprehensive survey of related industries
- Covers six primary fields and three device technologies for crosscutting fields
- Survey opinions of experts all over the world concerning the future visions
  (Abundant response)
- ***With All JFCA's Might!***

On Sale Now for $2,400.
For purchase or further information:
Fine Ceramic Roadmap 2050 - The American Ceramic Society

For inquiry, contact Ms. Koyanagi, JFCA:
koyanagi@jfca-net.or.jp



Roadmap Target Area	
Primary Fields	Transportation
	Telecommunications
	Medical
	Energy
	Infrastructure
	Environment
Cross-cutting Fields	Sensor
	Battery
	Semiconductor

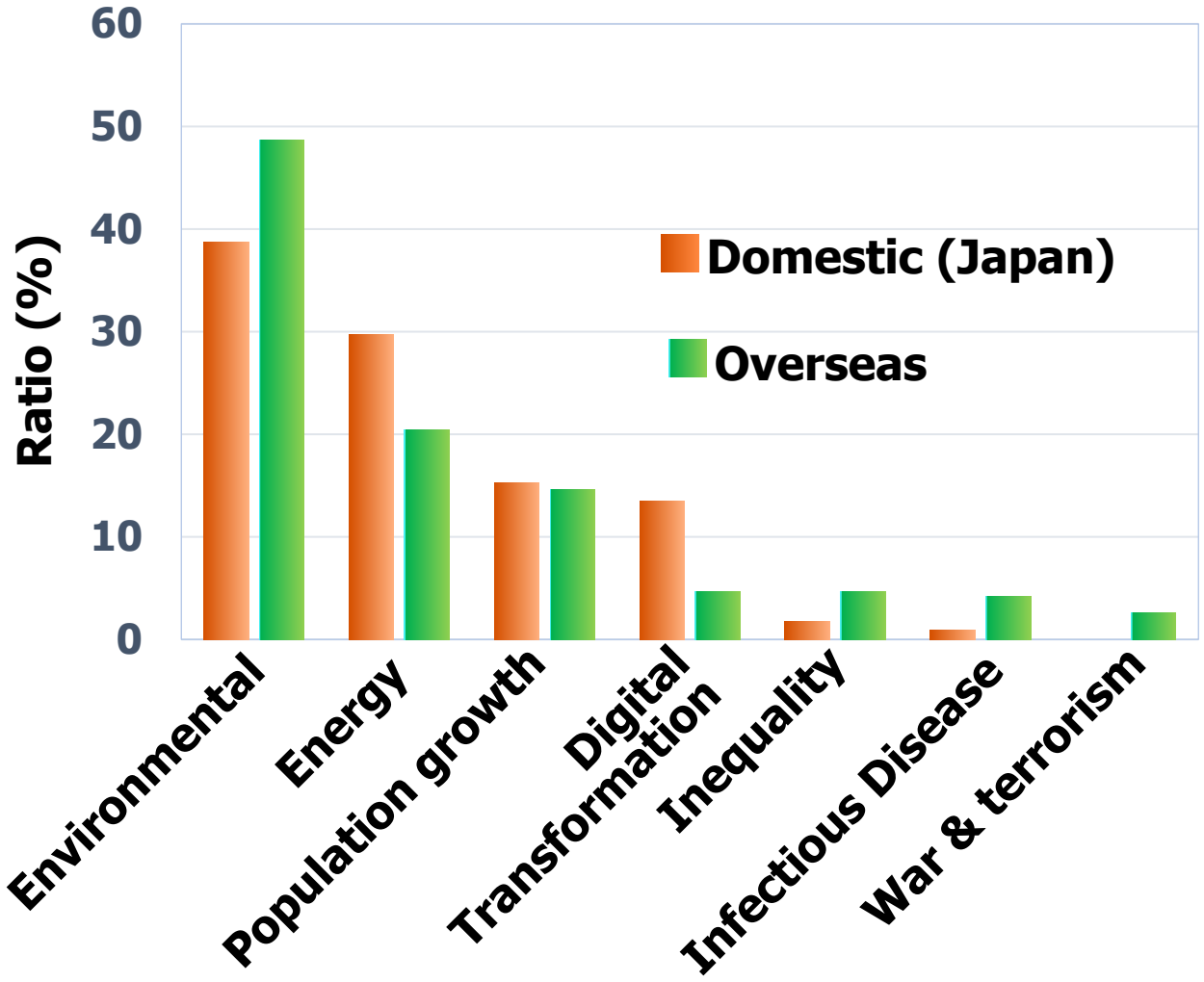
FC Roadmap 2050 Opinion Survey

Questionnaire on Future Advanced Ceramics

- The Japan Fine Ceramics Association (JFCA) conducted a survey for opinions of researchers and engineers worldwide on future visions of advanced ceramics over the coming 3 decades.
- Asking the following Questions:
  1. Major issues that will affect society?
  2. Major application fields that will be influential to ceramic industry?
  3. Key technologies needed for future development of advanced ceramics?
  4. Major innovations in advanced ceramics in the last 4 decades and in the coming 3 decades?
  5. Driving force needed for future development of ceramic industry?
- 38 domestic responses and 64 from overseas.

FC Roadmap 2050 Opinion Survey

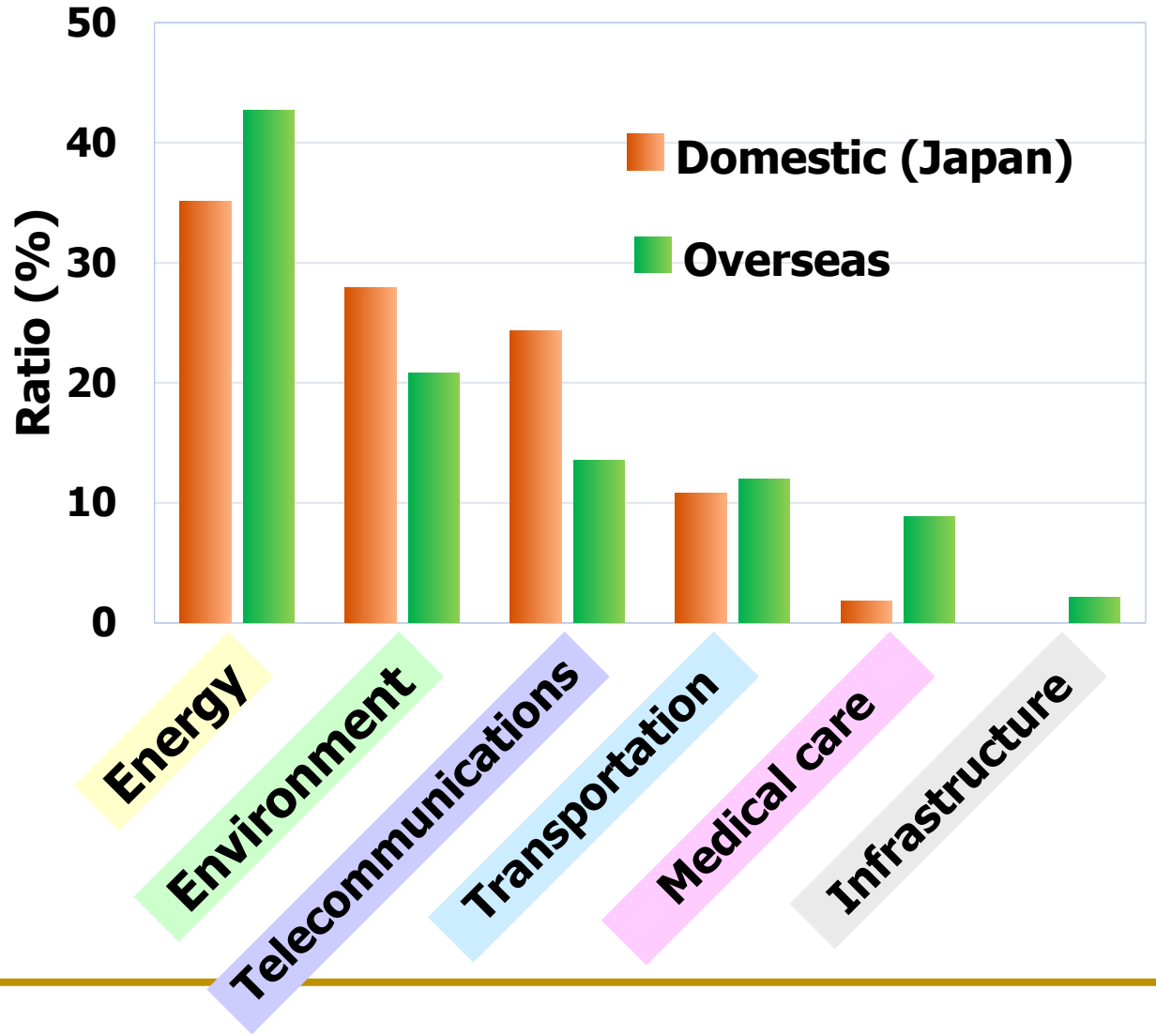
Major issues that will affect society?



- **Respondents selected major issues that will affect society from 6 candidates.**
- They showed great concerns over "Energy" and "Environmental"
- Global warming due to the emissions of the greenhouse gases will be the most serious concern.

FC Roadmap 2050 Opinion Survey

Major application fields that will be influential to ceramic industry?



- **Respondents selected major fields that will be influential to ceramic industry from 6 candidates.**
- Both "Energy" and "Environment" drew a lot of attention.
- Particularly, climate action in the energy field is expected to spur new technological innovations and industry (Green New Deal.)
- "Telecommunications" is thought more influential in Japan, in part due to the strong domestic industry in this field.

FC Roadmap 2050 Opinion Survey

Key technologies needed for future development?

Top 10 Key Technologies selected by overseas respondents from 58 candidates divided in the 6 different fields (shown in the previous slide)

Ranking	Key Technologies
1	3D printing technologies for manufacturing medical materials in bio-use
2	CMC materials for a lighter airplane with high propulsion efficiency
3	Electrode materials for rapid and high current charge and discharge
4	Environment-friendly battery materials
5	Adsorption and membrane materials for broad use of carbon dioxide removal devices
6	Implantable sensors
7	Fuels for renewable energy
8	Solid oxide electrolytic cell materials for hydrogen production
9	Sensors for fault and defect detection in infrastructures
10	Flexible and expandable perovskite-type solar cell materials

FC Roadmap 2050 Opinion Survey

Key technologies needed for future development?

Top 10 Key Technologies selected by domestic respondents from 58 candidates divided in the 6 different fields (shown in the previous slide)

Ranking	Key Technologies
1	Electrode materials for rapid and high current charge and discharge
2	Solid oxide electrolytic cell materials for hydrogen production
3	Adsorption and membrane materials for broad use of carbon dioxide removal devices
4	Material informatics for creating new materials used in ceramic electro-devices
5	Nanomaterials technologies for miniaturization of ceramic electro-devices
6	Multilayers technologies for larger capacity
7	Cost-effective electrode materials
8	Insulating heat dissipation substrate for power semiconductor devices
9	Fuels for renewable energy
10	Wide-band-gap semiconductor materials for power electronic devices

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Major innovations over the last 4 decades?

Category	MajorInnovations
Application	MLCC, SOFC, LED, Battery, Bio & implants, CMC, TBC/EBC, Communication, Heat/corrosion/wear/resistant, Sensors, Actuators, *etc.*
New materials	New photovoltaic, New superconductors, Bio-reactive, Wide bandgap semiconductors, Single crystal piezoelectric, *etc*.
Properties improvement	Better dielectric/piezo-electric properties, Better mechanical/structural reliabilities, Smaller-size/larger capacity MLCC, *etc.*
Structure control	Nanostructure, Fiber/particle reinforced, Porous structure, More reproducible microstructure, *etc.*
Processing	Low-temperature sintering, Thin-layer/multi-layer processing, Joining, Coating, 3D printing, *etc.*
Analysis/ Evaluation	Computational materials science, Advanced observation/measurement techniques, *etc.*

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Major innovations over the coming 3 decades?

Category	Major Innovations
Application	H_2 energy cycle, CO_2 separation, Water purification, Electronic, Communication, Transportation, Medical, *etc.*
New materials	Materials search via. MI/AI, Polymer-integrated ceramics, Self-crack-healed ceramics, *etc*.
Properties improvement	Multi-functionality, Harsh environment resistance, New properties of ceramic/non-ceramic composites, *etc.*
Structure control	Atomic-level control, Precise surface/interface control, Integrating dissimilar phases, Critical defect control, *etc.*
Processing	Sensor/monitor-controlled manufacturing, Zero-waste production, Recycling/reusing, MI/AI-incorporated, Advanced 3D printing, *etc.*
Analysis/ Evaluation	Advanced modeling/simulation, Better prediction via. MI/AI, Visualization/monitoring of process, *etc.*

FC Roadmap 2050 Opinion Survey

Driving force needed for future development of ceramic industry?

Category	Driving Forces
Society/research system	• Effective industry-academia-government collaboration • Government initiatives & supports • Global interaction & partnerships on world-level issues
Human resource development	• Nurturing next-generation for future ceramics • Nurturing young researchers having strong motivation of R&D • Need more investment for education.
Technical issues	• Interdisciplinary research for optimizing potential • Integration technology for multifunctionality • More fundamental research • Persistent efforts for elucidation on structure-property relationship

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JFCA
Japan Fine Ceramics Association

DANKE!

Merci!

Obrigado!

Thank You!

Shukriya!

감사합니다!

謝 謝！