

Research and development and production systems of the NICHIAS Group that generate products and services that are the embodiment of the TATSU-TAMOTSU™ (Insulation and Protection) technologies. In collaboration with the business divisions, we are engaged in manufacturing that serves society

## Research & Development

### Message from the General Manager of the Research & Development Division

TATSU-TAMOTSU (insulation and protection), the technological foundation of our Group, has evolved over many long years together with our customers in various fields. The demands of the times and the market change greatly from one day to the next, and in order for us to continue our contributions toward building a sustainable, bright future, we are pushing to expand and refine our TATSU-TAMOTSU (insulation and protection) technologies.

Sealing technology, thermal insulation technology, soundproofing technology, fireproof technology, corrosion-resistant technology, and clean technology — those are our Group's "Six Technologies." Together with the diverse elemental technologies that support, they are indispensable even in growth industries such as information and communications, semiconductors, next-generation energy, and mobility. Further development of these technologies is needed in order to meet market demands and to keep pace with the speed of change. Furthermore, as part of our activities to create new businesses and technologies, we intend to enhance our open innovation our initiatives to digitally transform our research together with external partners such as universities, external research institutions, and venture companies.



**Koji Iwata**  
Division Director of Research & Development Division

### Main Initiatives

#### 1. Information, communications, and the semiconductor industry

Smartphones, IoT devices, communication and network equipment, autonomous driving systems, and other information and communication devices are becoming increasingly sophisticated year by year. All these fields rely on high-speed, high-frequency circuit boards. Fluoropolymer, characterized by its low transmission loss, is gaining significant attention as a material capable of satisfying the demand for even higher speeds. However, fluoropolymers have weaknesses of their own — namely, a high thermal expansion coefficient, poor adhesion, and being difficult to combine with copper foil and other circuit materials. Using our fluoropolymer composite technology and proprietary molding technology as a starting point, we are accelerating our research and development with a focus on solving those challenges.

#### 2. The renewable energy field

With Japan's push toward sustainability, the concept of a hydrogen society has been gaining attention in particular. Liquid hydrogen, liquefied ammonia, and methylcyclohexane (MCH) are attracting attention as hydrogen carriers for efficient hydrogen transportation. Our TATSU-TAMOTSU (insulation and protection) technologies can contribute to all aspects of the hydrogen industry, including production, transportation, storage, and usage, and we are enhancing our research and

development for that purpose. Our particular expertise lies in thermal insulation materials covering a full temperature range, from cold to hot, along with technologies for evaluating and designing such materials, and we are actively expanding our capabilities into the cryogenic temperature range.



Cryogenic thermal conductivity measuring device

### Future Challenges and Outlook

NICHIAS excels in customer-focused research and development. We can leverage our broad range of business areas and technologies to provide technical solutions that satisfy the problems and demands of customers. As we continue to enhance our core technologies, our goal is to implement open innovation practices in order to accommodate the speed of technological progress and changes in the market environment. Last year, as part of this initiative, we began using NanoTerasu, a high-brightness synchrotron radiation facility that had been set up at Tohoku University. Going forward, we intend to make further use of the "coalition," a voluntary alliance that generates results through industry-academia collaboration. We will also expand our connections with universities, startups, venture companies, and external research institutions in order to facilitate creativity in new areas. Our TATSU-TAMOTSU (insulation and protection) technologies can contribute to these external partnerships, and they are enhancing our research and development efforts. Our particular expertise lies in thermal insulation materials covering a full temperature range, from cold

to hot, along with technologies for evaluating and designing such materials, and we are actively expanding our capabilities into the cryogenic temperature range. These enhancements will enable us to conduct research from a wider variety of perspectives, and this is likely to lead to the development of innovative technologies. Digital transformation in research and development is also a major challenge. Consolidating the research and development information by using the information-management and sharing tools, we try to streamline the process. We also pay attention to MI (Materials Informatics) and examine how to use it in a NICHIAS Group's way. Even if excellent information analysis tools and AI technologies exist, human effort is required to make use of it.

In the research laboratory, we are committed to developing not only human resources that can utilize information technologies but also those who can use TATSU-TAMOTSU (insulation and protection) technologies. We expect this to further enhance our research and development capabilities and support sustainable growth.

\* Utilizing digital technologies for developing materials.



# Production

## Message from the General Manager of Production Division

There have been remarkable technological innovations in recent years, driving rapid change across all fields, and this trend is likely to continue. We recognize that our response to these changes — whether we succeed or fail — presents both opportunities and risks for the company.

When it comes to manufacturing, it has become necessary, as part of our social responsibility, to address greenhouse gas emission reduction, resource recycling, the coexistence of society with nature, and other environmental challenges, as well as the increasingly severe labor shortage and the need to reinforce our supply chains.

With regard to the NICHIAS Group's production activities, we are engaged in deploying our production strategy and making advancements in manufacturing as needed in order to respond to these challenges and changes. We will also continue to proactively make investments and technology improvements to secure production resources such as personnel, buildings, and production equipment, and to reduce our environmental impact.



Hiroki Asada  
Division Director of Production  
Headquarter Division

## Main Initiatives

At the Production Headquarter Division, we are addressing the following four important policies. The first is the establishment of a safe, secure, and stable production structure.

We proactively pursue safety and environmental improvements to ensure the peace of mind of plant employees and local residents while maintaining quality that our customers can rely on.<sup>[i]</sup> We are also focusing on the renovation and improvement of aging buildings and facilities as well as disaster management measures.

The second is the far-sighted securing of production resources. We will strategically consider the relocation of manufacturing bases and push for greater efforts to secure buildings, equipment, personnel, and materials in order to maintain flexibility in our responses to business changes.

The third is promoting environmental management. We are actively engaged in installing solar panels and promoting energy-saving initiatives both in Japan and overseas. Going forward, we will promote initiatives not only for decarbonization but also for encouraging resource recycling and coexistence with nature.

The fourth is the evolution and efficiency of manufacturing. We are proactively working to automate



Solar panels at NICHIAS HAIPHONG CO., LTD. (Vietnam)

processes, digitalize the flow of information, and adopt AI so we can compensate for the shrinking worker population in Japan and respond with more flexibility to business changes. Furthermore, we are further enhancing the ability of our production sites to implement improvements with the aim of boosting labor productivity through NKK (NICHIAS Kaizen Katsudo).

## Future Challenges and Outlook

Many changes are in store for society's future, including EVs that will enable a decarbonization society, changes in our energy, an increase in disaster risks due to climate change, labor shortages due to a shrinking population of workers, and growth in the semiconductor industry. Although these changes will pose numerous challenges for our production system, automation will allow us to accelerate our efforts to save labor and energy more than ever before, and we will transition various management tasks from digitalization to systemization as we advance toward our goal of manufacturing through smart factories. At the same time, we will need to simultaneously push forward with maintenance, preservation, and improvement activities for our older equipment.

One essential requirement for that is securing and developing personnel. We plan to actively pursue the hiring of new graduates and experienced workers and, furthermore, to utilize external resources in order to secure human

resources with skills related to engineering and digital technology. Our aim is to establish a robust training system and to secure and develop the next generation of talent.

Going forward, we will collaborate with all manufacturing bases in the pursuit of manufacturing that is both human-friendly and earth-friendly.



Utilization of automated transport robots



An automated finishing line for machined products