(Fiscal Year 2008-2012)

Tokai Region Nanotechnology Manufacturing Cluster

Life Sciences IT Environment Nanotech/Materials

Tokai Region

Creating World-Leading, Environmentally-Friendly Advanced Functional Materials and Devices

Cluster Vision

The strategy for the Tokai Region is “sustainable development as a leading global manufacturing center.”
Our objective is to create a Tokai Region Nanotechnology Manufacturing Cluster which utilizes advanced nanotechnology to further raise the quality levels of material and manufacturing technologies at the leading core enterprises and the small- and medium-sized enterprises which support the base of the automobile, machine tool, and aircraft industries in this region.
The key concept behind this cluster initiative is “Creating World-Leading, Environmentally-Friendly Advanced Functional Materials and Devices.” Based on advanced plasma nanotechnology science and engineering, we are carrying out research and development targeting greater material functionality and developing more advanced nano-processing technologies that will help save energy and reduce the environmental load. We also expand the use of our research results, as well as providing support for application research and prototype development. In this and other ways, we are working with other parties in the region to promote technology transfer and commercialization at core and small- and medium-sized enterprises.

Project Overview

In order to create a world-leading cluster, we carry out basic research to meet the needs of the region’s industries, based on the results from the first stage of the Knowledge Cluster Initiative and the R&D potential of the region’s universities. We also adopt a strategic regional approach to regional programs related to issues such as coordination, support of application research and trial manufacturing, and support of human resource development.

<Project Management (Creation of a System for Collaboration among Industry, Universities, and Government)>
The Tokai Region Knowledge Cluster Headquarters is the core organization for this initiative, and projects are carried out under the project policy that is decided at the Headquarters meetings.
To maximize the benefits of our regional projects, we also coordinate closely with Nagoya Urban Industries Promotion Corporation, Gifu Research and Development Foundation, and other related institutions that are partners in these projects.

<R&D Projects>
Based on the results and achievements of the first stage of the Initiative, and on the issues faced by the region’s industries, we focus our research areas and gather together leading researchers for R&D under the project concept of “Creating World-Leading, Environmentally-Friendly Advanced Functional Materials and Devices.” For R&D targeting the development of advanced nanotechnology materials and high-efficiency devices, we are focusing on advanced plasma nanotechnologies as we work to deepen and advance fundamental technologies, and then apply them to process technologies. The objectives of these projects include to promote a further breakthrough in advanced material and processing technologies at leading core and small- and medium-sized enterprises, as well as the steady collection and expansion of knowledge in the region.

Targeting Sustainable Development as a Global Top-level Manufacturing Center

Project Director
Yoshinori Ohtsuka

Yoshinori Ohtsuka is a former Project General Manager of the R&D Strategy Planning Dept. at the Technical Administration Div., TOYOTA MOTOR CORPORATION

From this year, I joined the business of the Tokai Region Nanotechnology Manufacturing Cluster, which for me is a very exciting experience. For many years I had been in charge of intellectual property management at companies, and in recent years I have had communication with persons in these fields. These include representatives of regional industries, universities, and government, as well as those of various associations. I believe that this project is the perfect opportunity to exploit my past experience.
The first issue on which I, as the new project director, particularly wish to focus is the creation of a scheme for research evaluation. Although this is a difficult issue, we intend to proceed efficiently by revising and abolishing research themes in order to concentrate on those which could be expected to produce results. The second issue is establishing an environment where excellent coordinators with extensive experience and abilities can exercise maximum leadership in the research themes, while also optimally exploiting the individual skills of each coordinator. The third issue is the creation of a scheme for intellectual property management. I intend to utilize my personal experience with intellectual property management and clarify the objectives which the Headquarters can accomplish.
Finally, we work on developing and achieving the concept for the creation of a global manufacturing center. While also considering the concept of the Aichi Prefecture Knowledge Hub, which is expected to begin operating in two years, we create opportunities for research and training that gather together many researchers from all over the world. As the new project director, I intend to work for these goals with close relationships among industry, universities, and government in the Tokai Region.

Cluster Headquarters

○President……Shinichi Kato
(Adviser, TOYOTA MOTOR CORPORATION)
○Vice President……Shigemitsu Homma
(Executive Director, Aichi Science & Technology Foundation)
○Project Director……Yoshinori Ohtsuka
○Chief Scientist……Yasuyoshi Inagaki
(Executive Trustee, Vice President, Toyohashi University of Technology)
○Deputy Project Director……Ken Nomura
○Deputy Chief Scientist……Shoji Noda
○International Collaboration Coordinator…Osamu Oda
○Science and Technology Coordinator…Yoshinari Kozuka, Toshiyasu Ito, Katsunobu Yoshimura, Yoshio Yoshida
(Gifu Research and Development Foundation)
○Technology Transfer Coordinator…Hisashi Sato

Core Organization

Aichi Science & Technology Foundation

Participating Research Organizations (Bold: Core Research Organization)

Industry…INAX Corporation, n-Factory Co., Ltd., NU EcoEngineering Co., Ltd., EL-SEED Corp., kai industries co., ltd., KATAGIRI ENGINEERING CO., LTD., KIKUSUI Chemical Industries Co., Ltd., Gifu-seito, SEKISUI CHEMICAL CO., LTD., CCI Corporation, Shindengen Electric Manufacturing Co., Ltd., STANLEY ELECTRIC CO., LTD., UV Craftory Co., Ltd., Daito Chemical Co., Ltd., TAIYO NIPPON SANSO CORPORATION, Taiyo Kagaku Co., Ltd., Takasago Industry Co., Ltd., TAKEDA PRINTING CO., LTD., TENRYU INDUSTRIES CO., LTD., DENSO CORPORATION, Tokai Optical Co., Ltd., TOKAI RIKA CO., LTD., Tokyo Electron Limited, TOYOJYUSHI CORPORATION, Dowa Electronics Materials Co., Ltd., Toyota Central R&D Labs., Inc., NGK INSULATORS, LTD., Hanaichi UltraStructure Research Institute Co., Ltd., FUJI MACHINE MFG. CO., LTD., FUJIMI INCORPORATED, MASUOKA CERAMIC RAW MATERIALS CO., LTD., MARUSU GLAZE Co., Ltd., Mizuno Corporation, MEIJO NANO CARBON Co., Ltd., YAMAGUCHI SEIKEN KOGYO CO., LTD., etc.
Academia…**Nagoya University, Nagoya Institute of Technology,** Meijo University, Gifu University, Toyohashi University of Technology, Toyota Technological Institute, Chubu University, Mie University, etc.
Government…Aichi Industrial Technology Institute, Nagoya Municipal Industrial Research Institute, Gifu Prefectural Ceramics Research Institute, Gifu Research Institute for Machinery and Materials, Japan Fine Ceramics Center, National Institute of Advanced Industrial Science and Technology, etc.
(Supporting Organizations)
Nagoya Urban Industries Promotion Corporation, Gifu Research and Development Foundation

Main Results

- Based on the foundation of the first stage results, we have achieved R&D results targeting the development of advanced plasma fundamental nanotechnologies, advanced nanomaterials, and high-efficiency devices.
- To monitor radicals in a reaction space, we have developed a compact radical monitoring device which measures hydrogen, oxygen, and nitrogen radicals, as well as concentrations of Cu, Pb, Cr, Cd, Zn, and Ga atoms. In future, this device is expected to be applicable to composition control for thin functional films deposited by spattering, and to monitoring of soil and water contamination.
- We are carrying out R&D related to glow discharge in liquids, and have shown that both the low-temperature formation of mesoporous silica and the high dispersion of nanocarbons in a liquid are possible. This is expected to become a core technology for the development of new nanomaterials.
- We have succeeded in growing GaN thin film crystals on a 6-inch silicon wafer with few defects, which is expected to reduce the cost of power electronics devices using GaN semiconductors, and become the global standard in future.

Radical Monitor
(Integrated Light Source and Spectrophotometer)

Glow Discharge in a Liquid

6-inch AlGaN/GaN HEMT Substrate