(Fiscal Year 2007-2011)

Life Sciences IT Environment Nanotech Materials

Shinshu Smart Device Cluster

Nagano Prefecture region

Realizing the advanced use of new nanotechnology and materials from industry academia collaboration and forming globally dominant Shinshu-type Clusters

Cluster Vision

With the Knowledge Cluster Initiative Program (1st stage) achievements as the core, Nagano Prefecture's prowess in high-precision processing technology, precision molding technology and device technology with the support of Shinshu University in nanotechnology and improving wide and international collaboration on government-industry-academia collaborative research, obtaining a global advantage for smart devices and promoting commodification and industrialization for the super module one rank up all allows us to create a world class cluster formation within Nagano Prefecture.

Project Overview

The following three important points will be emphasized to promote industry-academia-government collaborative research through regional collaboration and establishing worldwide dominance in smart devices and super modules:

①Cultivating and fulfilling nanotechnology and material supply companies in Nagano Prefecture.

②Establishing a "Coordination Center of nanotechnology and Materials" and promoting the efficiency of research and development by providing and centralizing information about nanotechnology and materials.

③Promoting the practical use of research achievements by nurturing company researchers through collaboration of research organizations and universities and improving the practical ability of graduates through internships in companies.

■Research and Development of Smart devices using Nanocarbon.

With the Shinshu University Faculty of Engineering at the core, the project will:

1) Create new composite materials using carbon nanotubes (CNTs) and other carbon nano materials, 2) Conduct research on energy application, composite plating, the development and practical application of composite materials, and bio-application, 3) Establish new technologies, 4) Create new devices.

■Research and development of Smart Devices using organic and inorganic Nanomaterials.

With the Shinshu University Faculty of Textile Science and Technology at the core, the project will:

1) Seek synthetic organic nano materials, and 2) Create organic EL and related devices, polymeric actuators, devices utilizing sol-gel technology such as high-strength heat-resistance films, odor/VOC sensors utilizing polymers, and devices using nano-diamond films.

■Research and development of Smart Devices using Interfacial Nano technology

With the Tokyo University of Science at the core, the project will:

1) Create nano-scale particles such as nano-scale hollow particles, nano porous polymers and colloidal crystals, and 2) Develop high-performance identification sensors and catalysts.

■Research and development to create and prototype devices.

With the Nagano Prefecture General Industrial Technology Center at the core, the project will:

1) Develop nano-particle composites, and commercialize various materials and parts, and 2) Research and develop high-quality thin films and commercialize various high-capacity devices using such films.

■Research and development of functional ink for ink-jet printers (Collaboration with relevant Ministries)

To further explore the highly-advanced ink-jet technology possessed by Nagano Prefecture, this project, with the Shinshu University Faculty of Textile Science and Technology at the core, will develop:

1) Organic EL, Fluorescent ink, 2) Edible ink, 3) Conductive ink, Insulating ink, 4) Ink for inorganic devices, and 5) Weather-resistant ink, non-bleeding ink.

■Establishing a Cutting-edge Nanocarbon R&D Center (Collaboration with international partners)

With the Faculty of Engineering and the institute of Carbon Science & Technology of Shinshu University at the core, the project will facilitate interaction with overseas researchers and organizations specializing in Nanocarbon technology, promote researcher exchange, and thus establish a cutting-edge Nanocarbon R&D center in Nagano.

■Human Resource Development

In order to develop and train nanotechnology researchers, special educational programs featuring the Nanotechnology Super College and the Nanotech nology Practical College will be held. Participants will be able to learn nanotechnology through both classroom lectures and practical courses. The programs will also send graduate students to participating private firms in order to foster young researchers and facilitate R&D activities for the cluster.

■Regional Projects to Establish Intellectual Clusters.

There have been various regional projects to help establish Intellectual Clusters. They include those to conduct research on the utilization of new materials, nurture technology seeds, and support firms intending to enter new industries. The activities of the Nanotech Forum Nagano also come under this category.

Project Director (General Manager)

Toshio Tatai

Having held prominent positions in Seiko Epson Corporation such as Deputy chief executive of Semiconductor Operations Division, and Deputy General Administrative Manager of Intellectual Property Division. Abundant experience in Research and Development, and Intellectual property fields.

Smart Devices and Industry-Academia Cooperation in Nagano

Based on 1st stage achievements, "Forming a Shinshu-type super cluster" was positioned as a medium to long-term basic strategy of the "Industrial Development Plan" targeting further development.

In the 2nd stage of the Shinshu Smart Device Cluster, we are promoting the commercialization results of research strongly via a wide-area system of industry-academia-government collaboration and aiming to create smart devices and a super module.

Following the 1st stage, we are intensively promoting the utilization of Nanotechnology by Shinshu University and forming internationally competitive clusters by establishing a cutting-edge nanocarbon R&D Center.

To create and form sustainable clusters, setting up the "Nagano Prefecture Nanotech and Material Utilization Support Center" (tentative name) with the management and provision of information by creating databases, raw materials supply, and supporting nanotech research.

In human resource development, which is vital in forming sustainable clusters, we strive to cultivate university and company researchers by internships and practical nanotechnology courses

Cluster Headcquarters

○President…… Hiroyuki Hagimoto, (CEO, Nagano Techno Foundation)
○Project Director…… Toshio Tatai
○Chief Scientist…… Toshihiro Hirai (Dean, Faculty of Textile Science and Technology, Shinshu University)
○Deputy Chief Scientist…Masayuki Okamoto(Dean, Faculty of Engineering, Shinshu University),
Yoshio Taniguchi(Professor, Shinshu University)
○Science and Technology Coordinators…Shingo Morimoto, Hiromitsu Todoroki, Kazutoshi Kusano, Katsuro Yamaoka, Eishi Momosaki
○Coordination Center of Nanotechnology and Materials ;Director……Shinichi Wakabayashi
○International and Public Collaboration ; Coordinator……Akio Owa

Core Organization

Nagano Techno Foundation

Participating Research Organizations (Bold: Core Research Organization)

Industry…Art Metal MFG. Co., Ltd., E and F Corporation, INOAC Technical Center Co., Ltd., Ueda Japan Radio Co, Ltd., Usui Kokusai Sangyo Kaisha Ltd., NEC System Technologies, Ltd., N.T.S. Co., Ltd., MK Seiko Co., Ltd., Engineering System Co., Ltd., Orion Machinery Co., Ltd., Olympus Corporation, Kimoto Electric Co., Ltd., KOA Corporation, Cosina Co., Ltd., SYVEC Corporation, Sun-kk Corporation, Citizen Fine Tech Miyota Co., Ltd., Shinano Kagaku Co.,Ltd., Shinano Kenshi Co., Ltd.,Shinano Fujitsu Co., Ltd., Japan Gore-Tex Inc., SEIKEN Co., Ltd., Seiko Epson Corporation, Ceratech Japan Co., Ltd., Dicel Novafoam Ltd., Chinontech Industries Inc., Tsukada Riken Industry Co., Ltd., Tokyo Seiden Co., Ltd., TOKKI Corporation, Napac Co., Ltd., Nissin Kogyo Co., Ltd., Nissei Plastic Industrial Co., Ltd., Japan Electronic Materials Corporation, Nihon Dennetsu Co., Ltd., Nomura Unison Co., Ltd., Fujikura Ltd., Fujikura Rubber Ltd., Fujimori Kogyo Co., Ltd., Permelec Electrode Ltd., Hokuto Denko Corporation, Hodogaya Chemical Co., Ltd., Micro Coatech Co., Ltd., Matsuyama Giken Co., Ltd., Mikuni Kogyo Co., Ltd., Minebea Co., Ltd.,Mimaki Engineering Co., Ltd., MEFS Co., Ltd. Morinaga Milk Industry Co., Ltd., Rubycon Corporation etc.

Academia…**Shinshu University,** Nagano National College of Technology, **Tokyo University of Science,** Matsumoto Dental University, Yamagata University

Government…**Nagano Prefecture General Industry Technology Center**

Main Results

The results of our research are listed below.

- Development of a practical model for an optical data communication system using an organic EL light source
- Development of a low CO_2 emission olefin resin and transparent resin with U.V. absorption capability
- Development of a low price Hetero-Gemini Surfactant
- Development of a water purifying facility applying light-leaking photo catalyst fiber
- Development of CNT composite material and thin wall forming technology

The technology of CNT-Silver composite plating is applied to the electrical outlet that is already available on the market.

The Nagano Techno Foundation has established "the Support Center for Effective Use of Nano Technology and Materials" to disseminate their results. They are actively disseminating their results in order to merchandise and commercialize as soon as possible.

Regarding the international collaboration, the Nagano Techno Foundation has concluded a memorandum of understanding (MOU) with Veneto-Nanotech in Italy and Nano-Quebec in Canada.

Shinshu University has concluded an MOU with certain research institutes in Italy, Canada and Korea.

In February 2009, the International Nano-Workshop was held with much enthusiasm in Nagano city by the Nagano Techno Foundation.

The electrical outlet（composite plating）

Concluding the MOU with Nano-Quebec in Canada