Life Sciences IT Environment Nanotech/Materials

Nagano / Ueda Smart Device Cluster

Nagano / Ueda

Developing creative and internationally competitive smart devices and product groups featuring them.

Cluster Vision

This program is aiming to jointly develop new technologies, products, and projects in collaboration with Shinshu University and development-oriented companies. We are working to achieve practical embodiment of technologies from Shinshu University in order to create ultra-fine, high-performance devices (elements and parts) and product groups utilizing such devices. Through such activities, our goal is to create new industry, increase employment opportunities, and boost the competitiveness of existing industries.

Project Overview

With participation by Shinshu University, Nagano Prefecture General Industrial Technology Center, Tokyo University of Science, and development-oriented companies, we are working to create smart devices that utilize CNT, organic and inorganic nanomaterials while promoting activities aimed at the development of new products and commercialization. Though these activities, we are improving industry-academia-government collaboration, creating human networks, developing human resources, and promoting international exchanges.

●R&D on smart functional devices using nano carbon composites
With the Shinshu University Faculty of Engineering as its core, this project is conducting research on new composite materials with Endo fibers and CNT as fillers in order to develop devices and compound modules with superior characteristics like thermal conductivity, electrical conductivity, mechanical characteristics, precision workability, and abrasion resistance.

●R&D on organic nano material devices using functional nano high-polymer materials.
With the Shinshu University Faculty of Textile Science and Technology as its core, this project is conducting research on organic materials based on functional nano macromolecule materials and developing organic light-emitting element technology. Progress is also being made in the development of applied products based on these technologies.

●R&D on commercialized applied technology with CNT composite materials.
With the Nagano Prefecture General Industrial Technology Center as its core, this project is conducting research on applied technology for commercialization using new composites with CNT as a filler.

●R&D on Inorganic nano material smart function.
With the Tokyo University of Science as its core, this project is conducting research on highly functional devices and applied products utilizing inorganic nanoparticles, thin films, and catalysts.

Project Director (General Manager)
Masayuki Akiyama

Trustee and Director General of the Production Technology Development Headquarters at Seiko Epson Corporation. He has broad experience with new enterprise creation having served, for example, as an industry-academia-government joint project leader.

Smart Devices and Industry-Academia Cooperation in Nagano

Approximately 60% of the industrial products shipments of Nagano Prefecture are devices such as parts and modules, many of which are competitive at the global level. The mission of our cluster is to create new products and enterprises and to achieve further major advances in market competitiveness by actively using nanotech in these devices. During this 5-year term, we have successfully received 233 patents, established 7 venture companies, and expect to commercialize 21 items.
We successfully created the foundation for formation of a sustainable cluster over the 5 years of the program. For example, a participating company built a production line for commercialization of CNT composite materials and a project to “develop a high-current inductor using pressed coils and new insulating materials” utilizing sol-gel technology was selected as a Regional Revitalization Consortium R&D Project by the Ministry of Economy, Trade and Industry in 2007.
Nagano Prefecture is the home of many small and medium-sized companies and an active site for relocation of manufacturing overseas. Many management executives, however, are dwelling on how to best approach manufacturing in Nagano. We are creating environments where synergistic effects can occur by organically combining the capabilities of universities and the latent potential of development-oriented companies. In this way, we are accelerating commercialization based on research results.
We are also actively laying the foundation for cluster formation with neighboring Niigata, Yamanashi, and Shizuoka Prefectures.

Cluster Headquarters

○President……Hiroyuki Hagimoto
(CEO, Nagano Techno Foundation)
○Project Director……Masayuki Akiyama
○Chief Scientist……Hirofumi Shirai (Trustee, Shinshu University)
○Deputy Chief Scientist…Akio Nomura (Trustee, Shinshu University)
○Science and Technology Coordinator…Shingo Morimoto, Juichi Kubo Ph.D.

Core Organization

Nagano Techno Foundation

Participating Research Organizations (Bold: Core Research Organization)

Industry…IAM Co., Ltd., Algol Corporation, E and F Corporation, Usui Kokusai Sangyo Kaisha Ltd., Engineering System Co., Ltd., Orion Machinery Co., Ltd., GAST JAPAN Co., Ltd., KOA Corporation, Cosina Co., Ltd., Sun-kk Corporation, Citizen Miyota Co., Ltd., Shinano Kenshi Co., Ltd., Shinano Fujitsu Co., Ltd., Seiko Epson Corporation, Seimi Chemical Co., Ltd., Ceratech Japan Co., Ltd., Tamagawa Seiki Co., Ltd., Chinontech Industries Inc., Tsukada Riken Industry Co., Ltd., Totoku Electric Co., Ltd., Toukai Rubber Industries Ltd., Tokyo Seiden Ltd., Nagano Keiki Co., Ltd., Nagano Tancho Co., Ltd., Nagnao Japan Radio Co., Ltd., Napac Co., Ltd., Nichicon Corporation, Nissin Kogyo Co., Ltd., Nissei Plastic Industrial Co., Ltd., Nippon Soda Co., Ltd., Nihon Techno Co., Ltd., Boron Japan Co., Ltd., Hioki E.E. Corporation, Nomura Unison Co., Ltd., Fujimori Kogyo Co., Ltd., Heat-Sink & OS Co., Ltd., Hodogaya Chemical Co., Ltd., Material Science Products & Engineering. Nagano Co., Micro Coatech Co., Ltd., Matsuyama Giken Co., Ltd., Mikuni Kogyo Co., Ltd., Misuzukogyo Co., Ltd., Minebea Co., Ltd., Mimaki Engineering Co., Ltd., Miyasaka Rubber Co., Ltd., MEFS Co., Ltd., Yamato Corporation,
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

1. Development on Ultra precision parts with CNT Resin Composite.
Precision parts that are extremely hard and have a low coefficient of friction and little variation in precision were developed by adding CNT and glass beads to resin.

2. Development of functional Gold (AU) Plating for Probes.
A special plating technique that ensures hardness, provides a low resistance, and provides solder adhesion has resolved issues with probes for testing of electronic components.

3. Development of Digital Circuits using Organic Materials.
An organic digital circuit was developed using a high-performance n-type organic thin film transistor. The circuit has achieved a signal gain of more than 500, a driving voltage of 5V, and a logic speed of 1 MHz.

4. Development of High-strength Transparent Nylon.
Transparent nylon with transparency and strength equivalent to those of acrylic was developed by adding liposomes filled with a modifier to nylon.