Kyoto Nanotechnology Cluster

Kyoto (Fiscal Year 2002-2007)

Life Sciences IT Environment Nanotech/Materials

To establish "Nanotechnology City Kyoto" that achieves innovations through nanotechnology, while optimally exploiting Kyoto's characteristics and advantages

Core Organization
Advanced Scientific Technology & Management Research Institute of Kyoto (ASTEM RI)

Participating Research Organizations (Bold: Core Research Organization)

Industry···Abel Systems Incorporation, ALGAN K.K., Alps Electric Co., Ltd., NK Research Co., Ltd., EpiQuest, Inc., EpiTech Inc., Oike & Co., Ltd., Omron Corporation, Kyocera Corporation, Kyoto Instruments Co., Ltd., Gunze Ltd., Chemco Scientific Co., Ltd., Konica Minolta Technology Center Inc., Samco Inc., Shimadzu Corporation, Shinwa Chemical Industries Ltd., Ceramic Forum Co., Ltd., Daikin Industries, Ltd., Daigaku Gijutsu Kaisei-sha Ltd., Toyo Corp., Toyobo Co., Ltd., Toyoda Gosei Co., Ltd., Towa Japan Co., Ltd., Nakashima Propeller Co., Ltd., Nichia Corporation, Bioface Co. Ltd., Harima Chemicals, Inc., Hitachi Chemical Co., Ltd., Hitachi Ltd., Fukuda Metal Foil & Powder Co., Ltd., Horiba, Ltd., Mycom, Inc., Mutual Corporation, Musashino Chemical Laboratory, Ltd., Murata Manufacturing Co., Ltd., Rohm Co., Ltd., etc.

Academia···**Kyoto University** (Graduate School of Engineering, Innovative Collaboration Center), **Kyoto Institute of Technology** (Graduate School of Science and Technology), **Ritsumeikan University** (Research Organization of Science and Engineering), **Doshisha University** (Doshisha Business School), Japan Advanced Institute of Science and Technology, Iwate Unversity, Kobe University, University of Tokushima, etc.

Government···Research Institute of the National Cardiovascular Center, etc.

Project Overview

● Project Objectives

Establishing "Nanotechnology City Kyoto"

Aiming to make Kyoto a most attractive information hub by providing nanotechnology-related information and marketing research results to nanotechnology-advanced countries and regions, the Knowledge Cluster Initiative promoted the establishment of "Nanotechnology City Kyoto" by helping local companies develop new products and encouraging business inauguration.

- Establishing "Kyoto San-Gaku-Kou Renkei Kikou," an industry-academia-government collaboration base of the "All Kyoto Framework"
- Developing the "Katsura Innovation Park," a hub for creating new regional industries, and inviting companies there
- Operating programs for fostering human resources and educational programs (holding KYO-NANO Meetings, publishing "Rakuchu Rakugai Nanotech Banashi (Stories on Nanotechnology in and around Kyoto)," etc.), and targeting wide-ranging organizations and people, including companies and local residents, with the objective of establishing a regional cluster.

● Organizational Structure

President: Masao Horiba (Supreme Counsel of Horiba, Ltd.)
Project Director: Tatsuro Ichihara (former Director and Executive Vice President of Omron Corporation; former Executive President of Kyoto Sisaku Corporation)
Chief Scientist: Kazumi Matsushige (Professor, Graduate School of Engineering, Kyoto University)
Number of participating research institutes: 8 institutes, 52 persons
Number of participating companies: 36 companies, 60 persons

● Research themes

- ○Developing nanostructure surface treatment/analysis equipment
- ○Thin films and nanoparticles for industrial applications
- ○Establishing photonics technology
- ○Nano-bio fundamental technologies
- ○Creating nature-friendly nanomaterials
- ○Project in cooperation with the relevant ministries

● Main achievements

New products developed: 30 products
Achievements adopted by other businesses: 54 cases
Business inauguration: 8 companies

Main Results

1. Development of compound semiconductor ultraviolet sensor with high sensitivity, durability and heat resistance

<ALGAN K.K. + Doshisha University + Kyoto University + Japan Advanced Institute of Science and Technology>

ALGAN K.K., a venture company born from this project, successfully developed the world's first sensor capable of detecting ultraviolet rays of a specific waveband. This sensor, based on gallium nitride and aluminum gallium nitride, offers improved resistance to long and strong ultraviolet exposure and improved temperature characteristics; where traditional silicon ultraviolet sensors fall short. This sensor excels in discriminating ultraviolet wavelength, allowing ultraviolet monitoring to meet specific needs, e.g. monitoring ultraviolet illumination for semiconductor cleaning and disinfection treatment, and checking the ultraviolet permeation rate of cosmetics and clothing. Following the First Stage of the project, an industry-academia-government collaboration base for developing ultraviolet sensors was established; primarily assisted by the Kyoto Innovation Center and tenant companies of the Kyodai Katsura Venture Plaza of the Organization for Small & Medium Enterprises and Regional Innovation, JAPAN to promote research and development in this field. This enabled ALGAN to mass-produce sensors and the company commenced marketing a portable ultraviolet sensor named "UV checker uvia" to the healthcare industry. This research theme was again adopted in the Second Stage; research and development on this theme have been continuing, with the aim of improving accuracy to introduce the sensor in fields where ultraviolet exposure technology is needed.

UV checker uvia 1.2

2. Development of simple on-site diagnostic equipment<Horiba Ltd. + Ritsumeikan University>

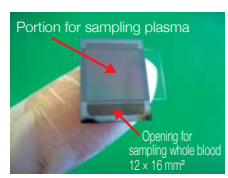
Through the concerted efforts of Ritsumeikan University, which has targeted the industrial application of its micro-machine technology, and Horiba Ltd., which develops systems to support healthy, safe and secure lives, a plasma-separating chip was developed, which, when blood is dropped onto it, can swiftly and easily separate plasma from blood.

Horiba and Ritsumeikan University have successfully facilitated the rapid separation of plasma from whole blood without using motive power, e.g. pumping power, by creating a chip based on their proprietary design, featuring a minute channel structure and a hydrophilic and water-repellent face and using MEMS* technology. Research on this theme has been continuing in the Second Stage. The goals are: to create compact, highly usable biochemical instrument/analysis equipment by integrating a plasma-separating chip and a biochemical sensor (chromogenic reaction and measuring units); to improve traceability management by combining a sensor unit with the wireless Internet, improve usability through ubiquitous means and commercialize POCT* simple on-site diagnostic equipment.

- Blood-separating efficiency: minimum 98%
- Plasma-sampling capability: 100 nl (maximum 5 min.)
- Hemolyzation: none
- Sensitivity: 10 nA minimum for current change at a glucose concentration of 200 mg/dL

* MEMS: Micro Electro Mechanical Systems

* POCT: Point Of Care Testing (testing at bedside in front of patients, testing by patients themselves at home, such as blood-sugar self-measurements, etc.)



Simple on-site diagnostic equipment (Plasma-separating chip)