



Kyoto and Keihanna

To establish a global hub in Kyoto for developing nanotechnology-based, highly functional materials to help resolve global environmental problems

Cluster Vision

Kyoto has regional advantages:

- Home to many research-centered universities that create and market state-of-the-art research products
 - Home to highly functional materials manufacturers that operate globally through their own product development capacity
- Optimally exploiting the advantages described above, the Knowledge Cluster Initiative aims to establish the world's top-level knowledge cluster. To that end, in the Second Stage, using the fundamental nanotechnology developed in the First Stage, the Initiative will pursue its objectives by:
- Improving the functions of "materials," a traditional strength of local industries;
 - Concentrating on creating and using environmentally conscious, highly functional materials, in order to save resources and energy and environmental sensing;
 - Continuing to innovate the world's highest-level technologies; and
 - Establishing the "Kyoto Environmental Nanotechnology Cluster" with an internationally competitive edge and preeminence, to further power the industrial upgrade and global competitiveness.

Project Overview

1. Establishment of a hub for developing "Environmental Nanotechnology Materials"

With nanotechnology as the core, the research and development focus will be on "Energy Saving," "Resource Saving" and "Environmental Sensing," targeting the early commercialization of research products. Centering on local small- and medium-sized companies and venture companies, we will invite leading nationwide companies to concentrate industries relating to the environmental nano-industry (i.e. supported by highly functional and high use technologies of environmentally aware materials through nanotechnology). To promote commercialization of the research results, we will adopt a "needs-oriented" total management approach whereby the industry takes the initiative at all stages, from research and development through to product commercialization and marketing.

<Research themes>

Energy Research Group:

1. Development of electricity-saving nanotechnologies
2. Development of catalyst nanotechnologies for new energies

Resources Research Group:

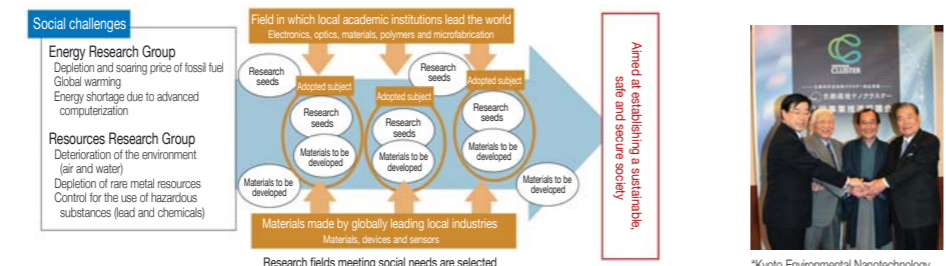
1. Creation of highly functional metallic materials
 2. Development of nanotechnologies to conserve the environment for living
- Development of laser nanotechnologies for processing sensors for environmental preservation (project in cooperation with the relevant ministries).

2. Enhancement of the entire-region supporting system for commercialization

A system for promoting commercialization of research results and intra-venture business will be constructed based on the strategy of the Knowledge Cluster Initiative, and a "Total Process Management-type Support System for Commercialization," a model for efficient development of business inauguration and commercialization will be established. To support technical transfers to and commercialization by small- and medium-sized companies and venture companies under the "All Kyoto Framework," a cross-sectional support organization consisting of local banking establishments, investing institutions, industrial support organizations, official experiment and research institutes, etc. will be formed. In addition, we will help foster human resources that serve as the basis for the regional cluster in cooperation with universities and the industrial world.

3. Establishment of global "Environmental Nanotechnology Hub" (Expansion Program)

As a hub for expansion and international collaboration, the "Kyoto EnviNano Center" will be created in order to market research products overseas, support overseas business of local companies, help establish overseas research hubs and promote mutual exchange with foreign countries of information relating to nanotechnology. We will work with regions, universities, research institutes, corporations, etc. throughout the world that have needs or track records of nanotechnology-related research or products, in order to gain further global recognition as the Environmental Nanotechnology Hub in Kyoto and thereby attract more information, human resources and businesses from all over the world.



"Working on the project based on the research themes to facilitate the optimal exploiting of regional characteristics"



"Kyoto Environmental Nanotechnology Cluster under the All Kyoto Framework"

Project Director
Tatsuro Ichihara



Former Vice President of Omron Corporation, Former President of Kyoto Sisaku Corporation

Kyoto Environmental Nanotechnology Cluster Takes off

The "Kyoto Environmental Nanotechnology Cluster" was established in Kyoto and Keihanna. Due to the economic slowdown in Japan and the urgent needs to address global environmental problems, expectations of science and technology are currently providing us not only with positive hopes as before, but also continued new challenges to cope with today's difficult conditions. In the Second Stage, I hope that over the next five years Kyoto will be acknowledged as a hub capable of offering nanotechnology to the energy and material fields in the Kyoto region as well as worldwide. To that end, we need to be committed to continue showing both achievements directly linked to steady revitalization of local industries and the strong capability to attract expertise worldwide. Fortunately, it was acknowledged in the First Stage that exploiting the regional potential is of great promise. As an extension of our efforts in the First Stage, we aim to establish the world-level "Kyoto Environmental Nanotechnology Cluster" during the five years of the Second Stage. In establishing the "Kyoto EnviNano Center," which will be newly set up to promote the Expansion Program, we expect the regional potential to be developed significantly while attracting brains throughout the world and actually collaborating with them. The key to achieving this is management leading to self-cleansing action. In the Second Stage, we will focus our efforts on optimizing human resources allocation, and the building and steady operation of mechanisms for allowing "visible management."

Cluster Headquarters

- President.....Masao Horiba (Supreme Counsel of Horiba, Ltd.; Chairman at Innovation Initiative Network Japan)
- Project Director.....Tatsuro Ichihara (Former Director and Executive Vice President of Omron Corporation; Former Executive President of Kyoto Sisaku Corporation)
- Chief Scientist.....Sei-ichi Nishimoto (Professor, Graduate School of Engineering, Kyoto University)
- Deputy Project Director.....Junichi Tanaka (Deputy General Manager of Commerce, Industry, Labor and Tourism Department, Kyoto Prefecture)
- Deputy Project Director.....Hiroshi Egawa (Chief at the Industry Promotion Section, Industry and Tourism Bureau, City of Kyoto)
- Deputy Chief Scientist.....Kazuyuki Hirao (Professor, Graduate School of Engineering, Kyoto University; Director of Kyoto Innovation Center)
- Business Deployment Program Director.....Gota Kano (Former Managing Director and Technical Manager, Matsushita Electronics Corporation)
- Expansion and International Collaboration Program Director.....Kazumi Matsushige (Professor, Graduate School of Engineering, Kyoto University)
- Expansion and International Collaboration Program Sub-director.....Shizuo Fujita (Professor, Graduate School of Engineering, Kyoto University)
- Science and Technology Coordinator.....Takahiko Oura, Tadahiko Horikiri, Yasushi Mizutani, Akira Suzuki, Hiroyuki Yamasaki, Kenichi Ohata, Kazuaki Ishigure, Tatsuo Morita and Hiroshi Kimura
- Expansion and International Collaboration Program Officer.....Akira Imada

Core Organization

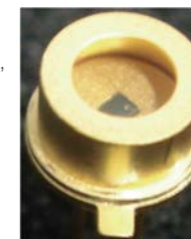
Advanced Scientific Technology & Management Research Institute of Kyoto (ASTEM RI)

Participating Research Organizations (Bold: Core Research Organization)

- Industry: ALGAN K.K., Ibiden Co., Ltd., Ibidenjushi Co. Ltd., Oike & Co., Ltd., Okuno Chemical Industries, Co., Ltd., Omron Corporation, Omron Healthcare Co., Ltd., The Kansai Electric Power Co., Inc., Kyo-chro Co., Ltd., Kyoto Electronics Manufacturing Co., Ltd., Kyoto Nano Chemical Co., Ltd., KYORIN Pharmaceutical Co., Ltd., Sakigake-Semiconductor Co., Ltd., Samco Inc., Shimadzu Corporation, JOHNNAN Corporation, Shinko MechatroTech Co., Ltd., Suzuki Sangyo Co., Ltd., Sumitomo Electric Industries, Ltd., Daikin Industries, Ltd., Takahashi Kinzoku Co., Ltd., Tayca Corporation, TOUKI Co., Ltd., Toshiba Mitsubishi-Electric Industrial Systems Corporation, Towa Japan Co., Ltd., Namiki Precision Jewel Co., Ltd., Nichia Corporation, Nidek Co., Ltd., Powdec K.K., Hamamatsu Photonics K.K., Harima Chemicals, Inc., Hitachi Metals, Ltd., Fukuda Metal Foil & Powder Co., Ltd., PlayHeart Co., Ltd., Horiba, Ltd., Matsunami Glass Ind., Ltd., Mutual Corporation, Musashino Chemical Laboratory, Ltd., Metek Kitamura Co., Ltd., Murata Manufacturing Co., Ltd., Ryoko Lime Industry Co., Ltd., Renaissance Energy Research Co., Ltd., Laser Solutions Co., Ltd., Rohm Co., Ltd., etc.
- Academia: **Kyoto University, Kyoto Institute of Technology, Osaka University, Kobe University, Doshisha University, Ritsumeikan University, Kyoto Women's University, Kochi University of Technology**, Tohoku University, Chiba Institute of Technology, Konan University, Utsunomiya University, etc.
- Government: **Kyoto Municipal Industrial Research Institute, Osaka Municipal Technical Research Institute**, etc.

Main Results

- **Biodiesel fuel manufacturing equipment with calcium oxide as a catalyst (prototype):**
Created by a group led by Masato Kouzu, Associate Professor at Doshisha University
This equipment offers the advantage of easily handling a catalyst by using a solid (calcium oxide) as a catalyst instead of a strong alkali, since it eliminates the need for the waste liquid treatment process, unlike in the traditional method. This environmentally friendly diesel fuel manufacturing equipment enables small-scale production for local consumption.
- **Agent for conserving water environment (prototype):**
Created by a group led by Kazuhiro Mae, Professor of Kyoto University, and Takahashi Kinzoku Co., Ltd.
This agent uses porous iron hydroxide to purify liquid waste, including that from factories, by adsorbing phosphoric acid, fluorine, etc. It also recycles collected phosphoric acid, fluorine, etc.
- **Surface-emitting laser using photonic crystals (prototype):**
Created by a group led by Susumu Noda, Professor of Kyoto University, and Rohm Co., Ltd.
This unique semiconductor laser enables single longitudinal mode oscillation over a large area. It is expected to suit various applications, including distance measurement and laser processing.



"Sensor of ultraviolet at a wavelength of 172 nm" Achieved by Kyoto University and ALGAN K.K.



"Lead-free, flexible organic ultraviolet sensor" Achieved by Kobe University and Daikin Industries, Ltd.

Development of Project Themes in the 1st Stage and the 2nd Stage

