**Kyoto Nanotechnology Cluster**

**To establish “Nanotechnology City Kyoto” that achieves innovations through nanotechnology, while optimally exploring Kyoto’s characteristics and advantages**

**Core Organization**
Advanced Scientific Technology & Management Research Institute of Kyoto (ASTEMIR)

**Participating Research Organizations**

- Basic Science Research Organization
- Environment: Kyoto University, Kyoto University, Kyoto University, Kyoto University, Kyoto University, and others
- Life Sciences: Kyoto University, Kyoto University, Kyoto University, Kyoto University, and others
- IT: Kyoto University, Kyoto University, Kyoto University, Kyoto University, Kyoto University, and others
- Science Park: Kyoto University, Kyoto University, Kyoto University, Kyoto University, Kyoto University, and others
- Others: Kyoto University, Kyoto University, Kyoto University, Kyoto University, Kyoto University, and others

**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 innovation.

- Establishing “Kyoto Nanotechnology City” based on an industry-academia-government collaboration base of the “All Kyoto Framework”

- Developing “The Kitano Innovation Park,” a hub for creating new regional industries, and inviting companies there

- Planning projects for fostering human resources and educational programs involving Kyoto Nano-Materials Nudging, publishing “Raihatsu Rakugaku Nanotechnology Banashi” (Stories on Nanotechnology in and around Kyoto), etc., and targeting self-creating organizations and people, including companies and local residents, with the objective of establishing a regional cluster.

**Organizational Structure**

- Project Director: Tatsuo Ishihara (former Director and Executive President of Omron Corporation; current Executive President of Kyotaku Science Corporation)

- Chief Scientist: Katsuyuki Kataoka (Professor Graduate School of Engineering, Kyoto University)

- Number of participating research institutes: 8 institutes, 52 persons

- Number of participating companies: 38 companies, 62 persons

**Main Results**

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

- “Katsuyuki Kataoka Kansai Science City” (Graduate School of Science and Technology), “Kansai Science City” (Graduate School of Engineering, Innovative Collaboration Center), “Doshisha University” (Graduate School of Science and Technology), and “Doshisha Business School” (Graduate School of Engineering, Innovative Collaboration Center), “Japan Advanced Institute of Science and Technology” (Graduate School of Science and Technology)

2. Main achievements

- New products developed: 3 new products

- Achievements adopted by other businesses: 14 cases

- Business establishment: 8 companies

**Project Object**

Kansai Science City

**Aiming to create new industries through teamwork and networking among industry, academia, and government, and by exploiting a unique combination of factors including science/technology, industrial infrastructure and cultural assets in Kansai Science City**

**Core Organization**
Kansai Interaction Plaza Inc.

**Participating Research Organizations**

- Industry: Honda Motor Co., Ltd., SANYO CORIUSARDO CO., LTD., ESQGIO CO., LTD., Environmental Research Center The Kansai Electric Power Co., Inc., OMRON Corporation, Nippon Steel &sumitomo metals Corporation, Mitsubishi Electric Co., Ltd., JIPAF (Japan Institute of Policy and Research, and others

- Academy: Nara Institute of Science and Technology, Osaka University, Osaka Electro-Communication University, etc., and others

- Government: Research Institute of Information Technology for the Earth, NITE, etc., and others

- Technology: Research Institute of Osaka Prefecture, Osaka Agricultural Technology Center, Nara Prefectural Institute for Agromedicine and Environment

**Project Overview**

Kansai Science City has established a large fund of intellectual capital at its core universities and major research institutes. Using this intellectual capital and through collaborative activities between industry-academia-government, we conducted research on technologies that will become the core of next-generation industries in the Human L-cube areas: namely life sciences, living technology, and learning applications toward full lives emphasizing human values, i.e. Lifestyle appropriate to the 21st century. Subsequently, we created a “knowledge reproduction cycle” that links research results with projects. Through such endeavors, we aimed to realize an innovation cluster combining IT and the life sciences.

1. In the life sciences field, three projects were implemented: “Development of Genomic Analysis Technology,” “Development of Plant Production Technology producing Featuring Value-aided Proteins in leafy vegetables,” and “Development for Medical Material Production Technology merging Genome Information and Material Science.”

2. In the living technology field, two projects were implemented: “Application/ Appliances of Advanced Man-Machine-Interface Technologies to Future Households Application” and “Development of Health/ Welfare Engineering Technology to Improve QOL.”

3. In the learning field, two projects were implemented: “Development of Next Generation e-Learning Systems & Learning Contents” and “Research on New Business Creation merging IT technologies and Cultural Heritage in Kansai.”

**Main Results**

1. Utilization of research results

- Through this research program, a platform for industry-academia-government collaboration has been built and the “Smart Office Environment Consortium,” launched which acts actively after this program.

- Utilizing the results, technology involving medical protein production with the genetic engineering of chloroplasts has been developing under the project supported by the Ministry of Economy, Trade and Industry.

2. Intelligent lighting technology for next-generation offices

- The intelligent lighting system, consisting of multiple intelligent lighting fixtures, multiple movable lighting sensors, and power meters connected to a single network, provides optimal illumination for any given location via independent illumination control for lighting equipment installed in intelligent lighting fixtures. This system is a model for next-generation lighting systems promoting energy conservation.

- Through the “Smart Office Environment Consortium,” we are aiming to create working spaces optimized for each office worker and to become the de facto office light standard for Japan and the world.

3. Medical protein production technology with the genetic engineering of chloroplasts

- Utilizing genetic engineering technology of leafy vegetables, we were able to produce a tetanus vaccine, which is an inactivated toxin protein, thereby establishing basic technology including applications for basic patients. This technology has now been forwarded to the METI-supported project “Production of human Thrombin-1 protein in lettuce chloroplasts facilitating collaboration among medical, agricultural and engineering fields.”

4. Environmental cleanup technology using plants and microorganisms

- By analyzing a useful strain in the Halophilic bacterium Halomonas elongata, we developed a highly responsive cell-surface engineering technology for bioremediation.

- We also succeeded in improving the heavy metal remediation of Halomonas cells by “arming” them (so they feature protein arms on the cell surface). This hope is that this will trigger the development of a remediation system to economically eliminate contaminants where this was not otherwise possible.