Keihanna Human L³ Cluster

Kansai Science City

(Fiscal Year 2002-2006)

Life Sciences IT Environment Nanotech/Materials

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 Keihanna Science City

Core Organization Keihanna Interaction Plaza Inc.

Participating Research Organizations (Bold: Core Research Organization)

Industry···Hagihara Farm Co., Ltd., SANWA CORNSTARCH CO., LTD., EZAKI GLICO CO., LTD., Environmental Research Center The Kansai Electric Power Co., Inc., OMRON Corporation, CUBIC INC., ATR, DoGA Corporation, Micronix Inc., NIPPON SYSTEM DEVELOPMENT CO., LTD., NTT DoCoMo Kansai Inc., and others

Academia···**Nara Institute of Science and Technology, Doshisha University, Osaka Electro-Communication University,** and others

Government···**Research Institute of Innovative Technology for the Earth, RITE,** Kyoto prefectural Institute of Agricultural Biotechnology, Technology Research Institute of Osaka Prefecture, Nara Agricultural Technology Center, Nara Prefectural Institute for Hygiene 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 oriented toward full lives emphasizing human values, i.e. lifestyles 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 Household Applications" 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

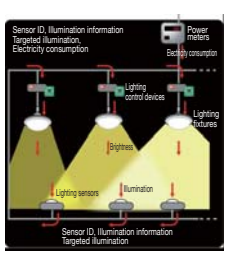
1. Utilization of research results

- 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 controlled and optimized for each office worker and to become the de-facto office lighting standard for Japan and the rest of the world.



Intelligent lighting system

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

Using technology to genetically engineer chloroplasts in leafy vegetables (lettuce), we were able to produce a tetanus vaccine, which is an inactivated toxin (protein), thereby establishing basic technology including applications for basic patents. This technology has now been forwarded to the METI-supported project "Production of human Thioredoxin-1 protein in lettuce chloroplasts featuring collaboration among medical, agricultural and engineering fields."


Chloroplast transgenic lettuce

4. Environmental cleanup technology using plants and microorganisms

By analyzing useful genes 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). It is hoped that this will trigger the development of a remediation system to economically eliminate contaminants where this was not otherwise possible.


Halophilic bacteria
Halomonas elongata