●Basic Stage

(Fiscal Year 2008–2010)

Fukui-Wakasa Area

Creation of new industries utilizing nuclear- and energy-related technologies

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Life Sciences
IT
Environment
Nanotech Materials
Others

Framework for Project Promotion

Chief Scientist……Hideo SHINGU (The Wakasa Wan Energy Research Center, University of Fukui)

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Nobuo OKUNO

Core Research Organizations

The Wakasa Wan Energy Research Center, University of Fukui

Major Participating Research Organizations

Industry…Eyetec Co., Ltd.; Urase Co., Ltd.; The Kansai Electric Power Co., INC.; Kyouwa Manufacturing Co., Ltd.; Kiyokawa Plating Industry Co., Ltd.; Institute of Nuclear Safety System, Inc.; Suden Co.,Ltd; Nicca Chemical Co., Ltd.; The Japan Atomic Power Company; Fukui Resources Recovery Co., Ltd.; Fukui Seed Co., Ltd; Hokukon Co., Ltd.; Hokuriku Electric Power Company; Hokuriku Heating Industry Co., Ltd.; Matsumoto Tekkosyo Limited Liability Company

Academia…Fukui University of Technology; University of Fukui; Fukui Prefectural University

Government…Japan Atomic Energy Agency; Fukui Prefectural Environmental Sanitation Research Center; Fukui Prefectural Industrial Technology Center; Fukui Prefectural Agricultural Experiment Station; The Wakasa Wan Energy Research Center

Aims of Project

The aim of this project is to establish a next-generation industrial cluster in the Fukui-Wakasa area to create a next-generation technology industry in Fukui in the fields of energy and the environment. This will support future industries within Fukui Prefecture that utilize nuclear- and energy-related R&D resources, in which area the prefecture has great potential.

We will investigate and develop highly productive green vegetables by ion beam irradiation and breeding techniques, and develop a heat transfer system based on a Bubble-Activated Circulating Heat pipe using technological seeds of The Wakasa Wan Energy Research Center. We will also develop treatment systems for dioxins and a brominated flame retardant using technological seeds of the University of Fukui, as well as techniques of hydrogen production, utilization, and analysis. We will introduce the R&D results to relevant industries and create new businesses by following a system of continuous innovation corresponding to market needs.

Contents of Project

1. Development of new varieties of green vegetables by ion beam breeding suitable for a (plant) green factory

We aim to develop highly productive vegetable varieties that mature rapidly and that are suitable for a green (plant) factory, using a new plant breeding method that combines ion beam irradiation and tissue culture techniques for green vegetables and the optimization of cultivation conditions.

2. Development of a dioxin treatment system using white-rot fungi

We are seeking the practical application of a dioxin treatment system using both a novel white-rot fungi that becomes more powerful following ion-beam mutation technology and a novel drum-type bioreactor suitable for the production of ligninolytic enzyme by the fungi.

3. Development of a wastewater treatment system that decomposes a brominated flame retardant to harmless compounds

This working group seeks to develop an absorbent for a brominated flame retardant, HBCD (Hexabromocyclododecane), using electron-beam-grafted fabrics. The separated HBCD will be decomposed to harmless compounds by irradiation using an electron beam or ultraviolet light. Following optimization for each technical element, we will prepare a prototype wastewater-treatment system for a polymer-processing plant and verify its performance.

4. Development and demonstration of a Bubble-Activated Circulating Heat pipe (BACH)

A new type of heat pipe was recently invented: the Bubble-Activated Circulating Heat pipe (BACH). The aim of this working group is to understand and optimize the heat transfer and operating characteristics of BACH to improve performance and reduce cost, incorporating investigations into the design and manufacturing of BACH. This group will also conduct a field test to verify BACH utilized as part of a snow-melting system around a fire-prevention water-tank, and examine several systems for the effective use of unused and waste heat.

5. Development of a hydrogen production method using a thermo-chemical and electrolytic process

We aim to develop a highly-efficient hydrogen production system that involves the electrolysis process of SO_3 at 500°C. In order to achieve high efficiency in utilizing heat from various sources, we will design and produce a heat pump using high-performance hydrogen-storage alloy.

6. Research and development of hydrogen management technology under extreme conditions

We will use laser-induced plasma breakdown spectrometry (LIBS) to establish a quantitative microanalysis method for hydrogen in steel, zirconium alloy, and titanium alloy with high sensitivity and high resolution.