

# Wakayama Prefecture North Area

Development of Organic Functional Materials Using Environmentally Friendly Resources & Technologies

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## Framework for Project Promotion

- Project Director.....Fumio Uekawa
- Chief Scientist.....Hisaji Taniguchi
- Science and Technology Coordinator.....Kentaro Tamaki

## Core Research Organization

- Industrial Technology Center of Wakayama Prefecture

## Major Participating Research Organizations

- Industry...Sanbo Chemical Industry Co., Ltd.,  
Wakayama Seika Kogyo Co., Ltd., Kishugiken Co., Ltd.,  
Sugai Chemical Industry Co., Ltd., Nihon Chemical Works Co., Ltd.,  
Konishi Chemical Ind. Co., Ltd., Shin-nakamura Chemical Co., Ltd.,  
Tsuno Food Industry Co., Ltd., Ezaki Glico Co., Ltd.
- Academia...Wakayama University, Osaka University,  
Wakayama National College of Technology, Osaka Prefecture University,  
Japan Advanced Institute of Science and Technology, Kyoto University
- Government...Industrial Technology Center of Wakayama Prefecture

## Aims of Project

The chemical industry is strongly developed in Wakayama Prefecture. This project aims to generate industry clusters to combine the "seeds" held by participating research organizations with the "needs" of enterprises and thereby encourage partnerships among these facilities in Wakayama Prefecture. In this context, we aim to develop sustainable technologies that will become a source of economic advancement and thereby stimulate development in the prefecture.

It is important that we prepare for collaborations among these organizations and encourage joint research. To achieve these aims, we will pursue the following: interchange between industry, academia, and government; formation of study groups; worldwide dissemination of the results of joint research; establishment of connections with enterprises in other fields; and progress based on research results of the Basic Stage and the results of regional research projects. We will also seek to combine products and technologies specific to this area with other products and technologies, and thereby develop new functional electronic materials and functional foods that will form the basis of new enterprises and the manufacture of new products.

## Contents of Project

### 1. Development of materials for electronic devices using environmentally friendly processes

We aim to develop materials for electronic devices using apparatuses that are able to reduce energy, environmentally friendly materials, and processes that are able to reduce energy.

- 1-1 Development of high-purity organic EL materials for generating a blue color
- 1-2 Development of specific inks for ink-jet printers
- 1-3 Development of materials with ultrahigh sensitivity using calixarenes

### 2. Development of organic-inorganic hybrid materials that contain silicon

We aim to develop new, special materials that combine the properties of organic and inorganic compounds; therefore, we will make use of silicon, which is abundant on earth and is a safe and renewable resource.

- 2-1 Development of fluorochromes that enhance whiteness
- 2-2 Development of electronic materials using compounds containing silicon that show many functionalities.

### 3. Development of functional materials using substrates extracted from rice bran

We aim to develop functional materials using substrates extracted from rice bran, produce plastic raw materials for industry, and develop these materials in a variety of industrial applications.

- 3-1 Development of functional monomers based on biomaterials
- 3-2 Development of functional foods using substrates extracted from rice bran

## Main Results

### 1. Development of materials for electronic devices using environmentally friendly processes

We have established a low-cost and simple manufacturing method for *p*-*t*-butylcalix[6]arene. We are currently studying a scale-up method for the manufacturing process as a joint enterprise. We developed RGB-emission materials based on a new concept.

### 2. Development of organic-inorganic hybrid materials that contain silicon

We synthesized compounds containing silicon with fluorochromes as part of a joint enterprise. We are currently evaluating these compounds for possible practical use.

### 3. Development of functional materials using substrates extracted from rice bran

We have obtained high-quality proteins from defatted rice bran and extracted antioxidants. We will hold presentations on these materials and promote them to potential customers. We have also developed plastic raw materials derived from rice bran, and are currently studying practical applications of the materials.



Rice bran proteins (right) and extracted materials derived from rice bran under subcritical conditions (left)



Ferulic acid (right) and styrene derivative used as a plastic raw material (left)

