



Yamaguchi

Aims at being a global leading edge for industries and R&D relating green materials (Green Valley), i.e. natural resources and energy saving materials

Cluster Vision

Pioneering construction of unique salt pans from the Mohri-Han (a feudal clan governed Yamaguchi area in the past) and natural resources such as coals and limestone have brought up dramatic prosperity to fundamental material industries. The DNA of the technological potential and the innovative industry activities has led to success that continues today.

The LED and nano-particle technologies cultivated in the former Cluster Programs have evolved into timely themes for environmental technologies such as solid-state lighting, solar batteries, and so on. The Tsuzumi-Drum innovation model will be applied where selection and fructification of the technical seeds are executed through the scrap-and -build process.

Project Overview

On the basis of the "Yamaguchi Prefectural Environmental Industries Multi-Park Plan," which was devised in 2003, the "Yamaguchi Green Materials Cluster promptly addressed natural resource saving & energy saving" as common themes. The followings are the three major R&D themes to be tackled:

- (1) Development of high efficiency LEDs (remarkably low power consumption) and LED-related applied equipment.
- (2) Decrease in the amount of silicon slurry scrapped during wafer slicing, and development of the recycling process.
- (3) Development of green materials with nano-particles dispersed (Establishment of synthesis and dispersion technologies for nano-particles, and related dispersion technologies to derive remarkable improvements in the photo-electric properties of liquid crystal materials.)

The goal for the cluster is to become a global R&D and industrial center for green materials by recruiting frontline researchers both domestically and overseas; aiming to prompt the question "Ask Yamaguchi" when studying any aspect of green materials. As fish crowd in clean waters, frontline researchers do likewise, with leading edge seeds and facilities. In parallel, the cluster promotes a training program for advanced engineers and creates new business through clarification of the exit strategy, which will naturally create new job opportunities and stop the workforce from leaving the prefecture, further stimulating Yamaguchi more economically vigorous and active. These series of challenges are known as "social innovation", which covers not only technological innovations but also the aim of becoming a social innovation attracting all local government, universities, and enterprises.



Yamaguchi prefectural Industrial Technology Institute, where the cluster head office is located.



Graduate School of Science and Engineering Yamaguchi University as the research center for high efficiency LED, and a decrease in the scrapped silicon slurry and recycling process.



Tokyo University of Science Yamaguchi as the research center for nano-particles to green materials.

Project Director
Mitsuhiro Kurashige



Ex-NHK, and Panasonic, Visiting professor, at the Kochi University of Technology while engaging in research and education for entrepreneur engineering.

Build a global green material base (Green Valley) through social innovation entwining industrialization and personnel training in addition to research

Via his experience, he had proposed a thinner-shaped TV project; which led them to success and revived the industries in the 1990s when the Japanese color TV industries, one of the star industries, that was repressed due to production shifting to countries overseas. Through his experiences in the former positions he will lead this cluster, based on the achievements and reflections experienced through the former cluster creation project and the city area industry-university-government cooperation promotion projects as well.

He is going to freely use unique management techniques as shown below: "Innovation" has been frequently mistranslated as "technical reform." However, to accomplish the cluster projects within the limited five year period, the following must be executed:

- (1) A concurrent non-linear model (simultaneous and parallel running of basic research to applied research),
- (2) Matrix management to introduce a sufficient synergy effect (entwining each development element and the assigned duties of each organization),
- (3) A Tsuzumi-Drum model to be employed where the selection and fructification of technical seeds are executed through the scrap and build process,
- (4) A Microsoft model intelligent property strategy (incorporating the core technologies, while opening only interface technologies, which can ensure positive compatibility between the acquisition of economic values and the technological diffusion.)

Cluster Headquarters

- President.....Yuichi Miura (Chief Director, Yamaguchi Industrial Promotion Foundation)
 - Project Director.....Mitsuhiro Kurashige (Project Manager, ITI, Professor,)
 - Researchers-general...Kazuyuki Tadatomo (Professor, Yamaguchi University)
 - Vice Researchers-general...Naoki Toshima (Professor, Tokyo University of Science Yamaguchi)
 - Science & Engineering Coordinator...Shunsuke Kobayashi (Professor, Tokyo University of Science Yamaguchi)
 - Jyunichiro Kita (ITI),
 - Seiji Miyagi (Tokuyama Co.)
 - Business Coordinator.....Kenzo Ikebe (ITI)
 - IP Coordinator.....Yuji Miyake (Sub Manager, ITI)
- [Cluster Center]
- Director.....Mitsuhiro Kurashige (Project Manager, ITI, Professor,)
 - Technical Manager.....Nobuo Kimura (ITI)
 - Administration Manager.....Hiroyuki Yoshimura (ITI)

Core Organization

Yamaguchi Prefectural Industrial Technology Institute

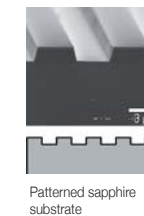
Participating Research Organizations (Bold: Core Research Organization)

- Industry...Choshu Industry Co.,Ltd., DIC Co., HDT Inc., Hosiden Co., KANEKA Co., KYOCERA Co., Japan Fine Steel Co.,Ltd., Mizuguchi Densou Co., Nagayama Electric Industrial Co., Ltd., Nippon Atomized Metal Powders Co., Sharp Co., Shintec Co., Ltd., TODA KOGYO Co., Tokuyama Co.TOSOH Co., UBEKOHKI Co.,Ltd.
- Academia...**Yamaguchi University,**
Tokyo University of Science Yamaguchi,
National Fisheries University,
- Government...Yamaguchi Prefectural Industrial Technology Institute, Yamaguchi Prefecture, Yamaguchi Industrial Promotion Foundation,

Expected results

[a] High efficiency LED devised on original patterned sapphire substrates

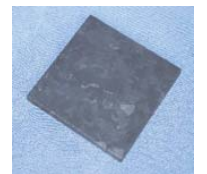
- high efficiency light emitter on original GaN substrates.
- Venture company establishment



Patterned sapphire substrate



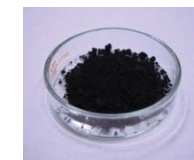
X. Huang et al J. Cryst. Growth 307 (2007) 341



K. Fujiwara et al J. Cryst. Growth 292 (2006) 282

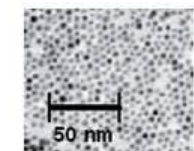
[b] Decrease in scraped silicon slurry and a recycling system to solve the global silicon shortage

- Original substrate showing no wettability with Si melt to free the silicon slurry scraped
- Recycling of scraped silicon slurry to a solar cell level by brominating



[c] Development of original green materials by adding nano-particles

- Less power consumption and high speed LCD
- Flexible device to convert heat to electricity
- Application of Nano-particles to optical film



Visualization of Seeds and Innovation Creation Scenario

