

## The Aichi/Nagoya area aims to establish new industries based on nano-technologies and accumulation of manufacturing know-how

### Overview

For 26 straight years, Aichi Prefecture has been Japan's leader in manufacturing product volume, and has accumulated advanced processing/materials which support the foundation of manufacturing in Japan.

We propose "the Vision of Environment-friendly Manufacturing, using Nano-Technology", with which we promote the Knowledge Cluster Initiative (KCI) where we try to develop "Autonomic Nano-Production Devices" which puts high added value on the products and decreases environmental load in the production system at the same time.

### Cluster Headquarters

- **President** ..... Tsuneo Ishimaru (Director of Aichi Branch, Japan Institute of Invention and Innovation)
- **Project Director**..... Osamu Takenaka
- **Chief Scientist (CS)** ..... Susumu Maruse (Senior Advisor , Meijo Univ. / Prof. Emeritus of Nagoya Univ.)
- **Science and Technology Coordinators** Takao Soma  
Shoji Noda

### Core Organization

Aichi Science and Technology Foundation

### Participating Research Organizations

(Bold: Core Research Organizations)

Industry···Toyota Central R&D Labs.,Inc., SHINANEN ZEOMIC CO.,LTD.,  
NIPPON LASER & ELECTRONICS LAB., POKKA CORPORATION, Taiyo Kagaku Co., Ltd.,  
DENSO CORPORATION, Osaka Vacuum,Ltd., NGK Insulators,Ltd., Nippon Sanso Corporation,  
Tanaka Kikinzoku Kogyo K.K., NOGE ELECTRIC INDUSTRIES CO.,LTD.,  
KATAGIRI ENGINEERING CO.,LTD., AISHIN SEIKI CO.,LTD.,  
COM Electronics Development Co.,Ltd., NU EcoEngineering Co.,Ltd., IMRA MATERIAL R&D CO.,LTD.  
Academia···**Nagoya University, Nagoya Institute of Technology**, Meijo University.  
Government···National Institute of Advanced Industrial Science and Technology,  
Aichi Industrial Technology Institute, Nagoya Municipal Industrial Research Institute.



Project Director

**Osamu Takenaka**

### Sense of Crisis is a Point of Departure

Why was the Aichi/Nagoya area, though Japan's No.1 area in manufacturing product volume, designated to be "the Cluster Trial Area"? The starting point was here, when I was appointed Project Director to strengthen the Cluster Headquarters. In the business world, I was always pursuing reasons for failure, asking: "why, why, why?" That is to say, I was "Learning from Failures". I directly met with Governor of the Prefecture, or Presidents of the Universities, and asked them their thoughts about this result. They were all shocked and made up their mind never to fail.

In order to stir up the local initiative, I worked on the Local Governments to establish a basic concept for Aichi/Nagoya Cluster. After that, so as to restructure the scheme of the project, we had dozens of heated discussions, over 40 hours, and then we settled on one theme to pursue. In this process, I am convinced that the persistent discussions resulted in a clear and unique development concept: "The Development of 'Practical Autonomic Nano-Production Devices' for practical nano-processing or productions".

It is important for everyone involved - from the heads of industry, academia and government, to the persons in charge of the actual work - to share a common critical mind and to have good teamwork to realize their own philosophy. It's my responsibility to get sufficient results from a "Good plan" and to coordinate talented persons efficiently .

At the very first year, we successfully started up a new business venture.

We continuously struggle with the attempt to create an internationally competitive base of Environment-friendly manufacturing industry in the area which has been the Japan's No.1 manufacturing zone, utilizing the result of the projects as a trigger for epoch-making development.

**Osamu Takenaka** is a former general manager of the production engineering R&D department at DENSO CORPORATION.

## Outline of the Joint Research by Industry, Academia and Government

Nagoya University originally developed plasma diagnosis, which measures atomic and molecular densities inside reaction space. Based on this original technology we aim to develop smart sensors for measurement and SAM nano-patterning. Then we will develop the autonomic nano-production device, which can produce nano-order scale products autonomously. For this device, we can produce super-micro processing, super-high sensitive sensor and high functional catalysts (various materials developed at Nagoya Institute of Technology and Meijo University). As a ripple effect, we can reduce consumption of energy and raw materials. For this research and development, we accomplish the environment-friendly production system.

- Development of nano-process control technology using smart sensors, and application to autonomic nano production device
- Development of SAM nano-patterning technology and application to autonomic nano production device
- Development of nano-cluster/interface-control material and application to super-high sensitive sensors
- Development of organic/inorganic hybrid nano-materials and applications to nano-catalysts

※SAM (Self-Assembled Monolayer): Atoms/molecules deposit naturally and form super-thin film (monolayer)

