

East Kanagawa Coastal Area

Development of Environmental-friendly Functional Surface Technologies and Their Transfer through "Public Prototyping Activities"

Kanagawa Academy of Science and Technology
KSP West 614, 3-2-1 Sakado, Takatsu-ku, Kawasaki City, Kanagawa, 213-0012 JAPAN
TEL: +81-44-819-2031



Major Participating Research Organizations

- Industry •• KANTO GAKUIN UNIVERSITY SURFACE ENGINEERING RESEARCH INSTITUTE KANTO KASEI CO., LTD., NISSAN MOTOR CO., LTD., Plating Industries Association of Kanagawa
- Academia •• Keio University
- Government •• Kanagawa Industrial Technology Center(KITC)

Project Promotion

- Project Director ••••• Yoshihiro Maki (Head, Kanagawa Industrial Technology Center)
- Research Consultant •• Hideo Honma (Professor, Kanto Gakuin University)
- Science and Technology Coordinator •• Kazuhiko Tamaki

Core Research Organizations

- Kanagawa Industrial Technology Center (KITC),
- Keio University Faculty of Science and Technology,
- Kanto Gakuin University Surface Engineering Research Institute (KGU-SERI)

Aim of research and development

One of the critical challenges faced by surface coating/treatment industries is the recent enforcement of environmental restrictions such as RoHs Directive in E.U., and its global expansion. In the light of response to such trends, this project aims to create cost effective manufacturing technologies with added value of "Environmental Friendliness", and through their transfer, to provide the local businesses, especially small and medium size enterprises (SME's), with new competitiveness and advantage in global market.

For these purposes, we will develop manufacturing technologies of

1. High-speed Atmospheric Pressure Plasma CVD of Large Surface DLC Films for Novel Functional Components.
2. Pre-treatment of Resin Surface using TiO2 Photo-catalyst for Metal Plating.
3. Pre- and Post-treatment for Metal Plating with Low Environmental Impacts and Simplified Quality and Process Control Techniques and Tools.

Furthermore, we will design, build-up and operate "Public Prototyping Activities" with capability of sample supply in semi-mass or mass-production scale for enabling effective technology transfer of development results to SME's.

Contents of research

1. High-speed Atmospheric Pressure Plasma CVD of Large Surface DLC Films for Novel Functional Components
Through evaluation of characteristics of the DLC films such as hardness, anti-wear resistance frictions or gas barrier properties etc., manufacturing parameters will be optimized, and real-scale continuous coating equipment will be designed and built-up. In addition, coating technologies will be developed to apply DLC on the substrates such as light alloys or resins that have been assumed to be hard to coat by DLC. The equipments developed will be operated in the future "Public Prototyping Activities".
2. Pre-treatment of Resin Surface Using TiO2 Photo-catalyst for Metal Plating
To strengthen the adhesion of metal films plated on resins, pre-treatment technology utilizing photo-catalytic function of TiO2 will be developed, which is expected to replace the on-going decomposition by hazardous chemicals such as chromium acid. Mass scale production line will be built up and utilized for the "Public Prototyping Activities".

3. Pre- and Post-treatment for Metal Plating with Low Environmental Impact and Simplified Process Monitoring and Quality Control Techniques and Tools.
The development targets include:
 - * Effective and environmentally mild technique for degreasing and removal of the various contaminants on the substrates.
 - * Chromium-free and highly anti-corrosive water repellent protective top coating film for metal plated surface.
 - * Simplified optical or electrochemical sensing technique and tools which enables on-site and real time management of plating bath or product quality such as glossy appearance.

