

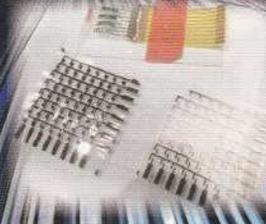
Functional Film, Paper, Foil, and Converting Technology

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## Producing Organic Conductive Inks Through a Simple Synthesis Method

Paper Electronics Research Association

The Paper Electronics Research Association, whose members include those from universities, corporations, and creative agencies, held its 20th Technology Research Presentation Conference in Tokyo this past September. In aiming to develop new applications using the characteristics of printing technology and paper, each event hosts company representatives, creators, and university researchers as speakers. During the most recent event, Professor Shuichi Maeda of Tokai University and Chair of the Department of Optical and Imaging Science and Technology, Tsuguo Yanai of Paper Art Studio, and Kenji Takasaki from MEIKO PRINTING CO., LTD., took the stage.

### Synthesizing Hybrid Inorganic-Organic Conductive Inks

The basic method for synthesizing organic conductive inks that disperse stably in water relies on hybridizing organic conductive polymers (polypyrrole, etc.) and inorganic particles (silica, etc.) at the nano-scale. Professor Shuichi Maeda of Tokai University explained this method using the example of polypyrrole silica as part of his talk. In this case, a syringe is used to introduce pyrrole to a solution containing dissolved iron chloride and colloid silica. In doing so, the solution steadily converts to a black ink over the course of 30 seconds to around one minute. The ink particles range from 100 to 200 nm, and do not precipitate out after they disperse. As such, the inks are stable, remain unchanged even after a year, and absorb more light than dyes used in

certain chemicals. The inks also remain stable after printing and drying, so do not peel off the paper. According to Professor Maeda, the greatest advantage of this simple method is its safety and the ease with which anyone can replicate it.

On the other hand, silica is an insulator, so its low conductivity is not suited to certain applications. In fact, polypyrrole silica has a conductivity that is a magnitude or two lower than that of pure polypyrrole. Hybridizing the inks with tin oxide, however, increases the conductivity to the same level or higher than that of standard polypyrrole.

Following this explanation, Professor Maeda introduced the use of these inks in applications like antigen-antibody reaction dyes and electronic paper. According to Professor Maeda, some areas of Europe already use these inks as antigen-antibody reaction dyes in pregnancy tests and AIDS tests.

### Paper Texture and Artwork

Tsuguo Yanai of Paper Art Studio has made his own paper since the mid-1980s, which he has used to create traditional paper crafts and works of art. This work initially stemmed from his desire to make original paper and print this with engraved copperplates. During the event, he discussed his experience thus far using videos and photos of his artistic process.

As Mr. Yanai explains, traditional materials like stone, wood, metal, and clay are often used as a medium in the art world, whereas paper has only served as a supporting material that is either drawn on or printed, for example. In response, he began presenting works of art from his de-

sire to use paper as an expressive medium that would stand alongside materials like stone and metal. In one example titled "Relic," which was on display at one of his exhibitions in September, Mr. Yanai recreated the faces of historical figures through the paper making process itself. In this case, black dyed raw paper materials are washed over a mesh to produce the images.

## Overseas Interest in Japanese Letterpress Printing

Kenji Takasaki succeeded his father as president of MEIKO PRINTING, a movable type (letterpress) printing company based in Osaka with 70 years of history, some 10 years ago. Having had absolutely no interest in printing earlier in his life, before taking over the company Mr. Takasaki established a cross-industry exchange group when he was still in his 20s, and became involved with various businesses, including internet cafes, commemorative school magazine printing, fortune telling, and melon bread food truck sales. Mr. Takasaki

returned to his father's company after his father began considering shutting down the business, at which time he started searching for other businesses based on the remnants of his more exciting life in Tokyo. In response to the boom in letterpress printing that was occurring at this time in Tokyo, he gathered together the second and third generations of managers at letterpress printing companies in Osaka and created the KANSAI MOVABLE TYPE CLUB. This organization holds letterpress printing events and has been covered by the media, both of which have rapidly accelerated the momentum of letterpress printing in Osaka.

The 12 plate, 24 color Ukiyo-e-like letterpress prints that Mr. Takasaki makes have also attracted interest from overseas. Similarly, he also uses letterpress printing together with gold foil discarded by gold foil companies, which, according to Mr. Takasaki, have become very popular in Taiwan and China. In addition to printing, Mr. Takasaki is also developing new businesses through collaborations with the presidents and owners of companies in other industries.