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Notice Regarding Development of Conductive Ink for Ink Jet Printing Using Copper Nanoparticles

Taiyo Nippon Sanso Corporation (“TNSC”) hereby announces that it has successfully developed conductive ink using copper nanoparticles which can be applied to ink jet printing for printed electronics.

1. Background

Printed electronics is a technology that uses conductive ink or paste containing copper or silver, which are highly conductive, to form conductive wiring in electronic components through printing technology. Etching technology*, the traditional method used for forming conductive wiring, requires a great number of complicated processes that generate a large amount of waste. Since this method poses a significant burden on the environment, printed electronics are attracting attention for being simpler and more environmentally friendly. Some examples of these printing technologies include screen printing and gravure printing, and in particular, ink jet printing that uses conductive ink is attracting a high level of interest as a technology that can support rapid model changes to electronic components and various types of small-quantity production as it does not require a printing plate.

2. Overview of Conductive Ink for Ink Jet Printing Using Copper Nanoparticles

TNSC possesses metallic nanoparticle synthesis technology which relies on its uniquely developed oxygen combustion technology.

The copper nanoparticles (a dried powder) synthesized in this process have a particle size of approx. 100 nm and are coated with a surface layer of copper oxide. Unlike particles synthesized through the typical wet process, these have no organic protective coating, so there is very little outgassing when the particles are sintered. In addition, they allow for low-temperature sintering. Up until now, TNSC has developed conductive paste that is expected to be used in RF tags, micro wiring, pressure sensors, and other applications.

By using copper nanoparticles and optimizing the composition of dispersing agents and solvents, we have now developed conductive ink suitable for ink jet printers. The copper nanoparticles within the conductive ink are held in a dispersed state over long periods of time, and can therefore be discharged from the ink jet printer without clogging the nozzle, making it possible to print micro wiring patterns. Additionally, conductivity can easily be demonstrated with photonic curing technology utilizing xenon lamps, etc. This conductive ink is expected to be used in applications such as touch panels for transparent conductive films and conductive wiring for organic LED lights using ink jet printing.

Specifications of Conductive Ink Using Copper Nanoparticles

Item	Specifications
Metallic density	30wt%
Viscosity	5~20 mPa · S



Fig. 1 Appearance of conductive ink



Fig. 2 Conductive wiring pattern made with copper nanoparticle ink printed using an ink jet printer

3. Future Plans

TNSC has organized a sample production system for this product at the Yamanashi Laboratory. Moving forward, we plan to continue efforts to introduce it to customers and provide samples to progress full-scale commercialization.

Notes:

* Etching : The process of cutting metal surfaces using corrosion. An anti-corrosion treatment is applied to the section that will be used, while the unnecessary section is eliminated using a treatment agent.

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