NobleLight



Xenon flash lamps for the highly efficient sintering of copper ink

Copper inks are a cost-effective alternative to silver inks when it comes to printed electronics for RFID or smart packaging. However, the sintering of copper ink on paper poses a genuine challenge. A co-operation between three companies: Promethean Particles, Dycotec Materials and Excelitas Noblelight, showed how copper nanoparticles in printed ink are easily and quickly fused by xenon flash lamps and thus form highly conductive and stable electronic circuits. Unlike silver, copper rapidly forms oxides in the air, which makes sintering more difficult or even impossible. So far, copper ink is often sintered in an oven under inert gas, which requires specialized environment not suited for every process line and is relatively slow. Xenon flash systems on the other hand, transfer a great deal of energy into the ink within milliseconds. This causes the ink to sinter so rapidly that no oxidation process takes place. In addition, the substrate, e.g. foil or paper, is hardly heated with this rapid energy transfer and is thus not damaged. Promethean Particles from Nottingham, UK, manufactures nanomaterials, Dycotec Materials is based in Swindon and produces inks and coatings, and Excelitas Noblelight has developed a Xenon flash lamp system for the sintering of

metallic inks in Cambridge.

"From discussions with our customer base, there is a clear need for digital additive processing with low cost ink systems. Our new high volume manufacturing facility has enabled us to demonstrate our capability to produce high quality nanoparticles at quantities in excess of 1,000 tonnes per annum", commented Laurie Geldenhuys, CEO of Promethean Particles. Dr. Richard Dixon, Managing Director of Dycotec Materials added, "using the Promethean Particles' nanomaterials we were able to produce high solids loading inks with demonstrable stability that can be processed using inkjet heads operating at high frequencies, ensuring compatibility with high volume production. Processing our inks with the Excelitas flashlamp system enabled excellent electrical conductivity to be achieved of ~3 m $\Omega/\Box/mil$."

Martin Brown, Applications Manager of Excelitas Noblelight commented that "photonic sintering of inks offers significant benefit over conventional oven processing that requires substantially larger footprints, higher operating costs and longer processing times. For copper inks, our Excelitas Xenon Flash technology is particularly well suited as the fast processing speeds overcome the copper oxidation issues."



Photo courtesy of Coatema Coating Machinery GmbH

Features

- Sintering copper ink on paper
- Excellent electrical conductivity of ~3 m Ω / \Box /mil., with regard to cross-section and mass of the material

Technical Data

- Nano copper ink with high solids content
- Xenon flash system
- Sintering within milliseconds reduces copper oxidation issues
- Rapid energy transfer protects the substrate from damage

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