



LASER-BASED MANUFACTURE OF SILVER CONDUCTIVE PATHS

Task

Printed conductive paths on flexible substrates boast a great deal of potential in electronic applications. Printing techniques enable structures to be manufactured from nanoparticulate metallic inks (e.g. copper, silver). Compared with conventional techniques, such as mask or lithographic processes, this process is flexible, inline-capable and saves resources, time and money. The necessary thermal post-treatment for drying, sintering and partially melting the particulate layer is completed by means of laser processes in order to facilitate the use of temperature-sensitive substrates.

Method

Nanoparticulate silver ink is deposited onto temperature-sensitive PET film using ink-jet printing. Using laser radiation with a wavelength of 532 nm, the printed layer is heated in order to obtain a conductive layer by means of drying, sintering and partial melting. Despite high temperatures in the layer, the high attained temperature gradients and the locally selective input of energy during laser treatment enables temperature-sensitive substrates to be used without damaging these.

Result

Silver conductive paths with a width of $< 100 \mu\text{m}$ can be manufactured on temperature-sensitive PET film and other substrates. By replacing conventional furnace processes with thermal laser post-treatment, a conductivity of over 50 percent of the bulk material can be achieved without damaging the substrate. Very good adhesive and bending strength is achieved on the PET film as part of this process. No cracks appear in the layer with a bend radius of up to 5 mm.

Applications

This process boasts numerous applications in electronics, particularly in the field of flexible electronics owing to the high conductivity despite temperature sensitivity of the substrates. Possible applications include sensors, RFID or displays.

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3 Ink-jet printer.

4 Demonstrator with silver conductive path.