High velocity laser printing of conductive tracks

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Abstract

Printing micrometer size conductive structures is a key challenge for the development of printed electronics. Inkjet technology is the main digital process currently used for this application, but it suffers from some drawbacks like head clogging and limitation to low viscosity inks. We use the laser-induced forward transfer (LIFT) technique to print at high-velocity long lines of metallic nanoparticle ink. A picosecond laser emitting at 343 nm with a repetition rate of 1MHz is used to realize 2D conductive tracks at velocity as high as 10m/s. The control of process parameters allows the fabrication of 20µm widthlines with various thicknesses and a resolution of few micrometers.
The physics of laser printing was studied by means of time-resolved imaging technique and these results areused to discuss the potential and limitations of this technology. Sensor electrodes were realized on flexible substrates as well as passive components like resistors and capacitors, by printing high viscosity inks. These applications will be presented to illustrate the feasibility of using high repetition rate laser for the fast and reliable printing of conductive structures.