23rd I²plus Seminar

Schedule: 11:00 ~, 10th April 2017

Place: ME Meeting Room (2F, Bldg #2, Noda)

Speaker: Prof. Ming-Tsang LEE

(Dept. Mech. Eng., Nat'l Chung Hsing U. (Taiwan))

Direct Silver Micro Circuit Patterning on Transparent Polyethylene Terephthalate Film Using Laser-Induced Photothermochemical Synthesis

Abstract: This study presents a new and improved approach to the rapid and green fabrication of highly conductive microscale silver structures on low-cost transparent polyethylene terephthalate (PET) flexible substrate. In this new laser direct synthesis and pattering (LDSP) process, silver microstructures are simultaneously synthesized and laid down in a predetermined pattern using a low power continuous wave (CW) laser. The silver ion processing solution, which is transparent and reactive, contains a red azo dye as the absorbing material. The silver pattern is formed by photothermochemical reduction of the silver ions induced by the focused CW laser beam. In this improved LDSP process, the non-toxic additive in the transparent ionic solution absorbs energy from a low cost CW visible laser without the need for the introduction of any hazardous chemical process. Tests were carried out to determine the durability of the conductive patterns, and numerical analyses of the thermal and fluid transport were performed to investigate the morphology of the deposited patterns. This technology is an advanced method for preparing micro-scale circuitry on an inexpensive, flexible, and transparent polymer substrate that is fast, environmentally benign, and shows potential for Roll-to-Roll manufacture.

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