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Oct. Oct. 6(Thu.) [Poster Session I]

Precision and Ultra-Precision Machining

Robot and Process Automation

[Poster Session I]

Oct. 6(Thu.)

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Ultra-precision Machining on Advanced Display Materials using a Femtosecond Laser

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One of the important factors in determining the precision of photon micro processing technology is the pulse width. Because the pulse width is the factor that determines the interaction between a photon beam and the material, the heat-affected zone created by the laser beam generally broadens with an increase of the pulse width and the precision decreases.

KEYWORDS : Ultra-precision, Micro-machining, Non-thermal, Femtosecond laser

1. Introduction

The photon minimizes the heat-affected zone, which allows processing within the sub-micrometers ranges due to the extremely short pulse width. Moreover, the ultra-short pulse photon has material independence due to the non-linear optical phenomena. Therefore, the photon is able to process any material.

In this study, we introduce our experiments results using femtosecond laser(λ=1025nm, JenLas®D2.fs model Jenoptik, Germany) micro-machining technology. The experiments were operated in Korea institute of machinery and materials.

2. Schematic of experimental samples

The purpose of our study is fabrication for conductive thin film layer on glass and polymer substrate. The ITO and Al is deposited on glass substrate and Ag nanowire random network is layered on the polymer substrate.

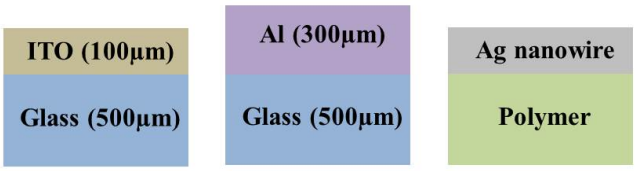

Fig. 1 The schematic pictures of the samples

3. Conclusions

We have experimented three different electrical conductive film on substrate using femtosecond laser system. The threshold of electrical conductive material, which are indium tin oxide (ITO) and aluminum (Al), are different from substrates threshold, we are able to remove the each material on the substrate. Additionally, silver (Ag) nanowire random network on polymer substrate fabrication is investigated. Although the patterned line has burr, its height is very low, less than 0.1 μm and the surface near the line is fine as normal surface. Due to the experiment result, we believe that the femtosecond laser micromachining for thin conductive layer have enough performances.

Fig. 2 Patterns by femtosecond laser irradiation (ITO, Al, Ag)

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