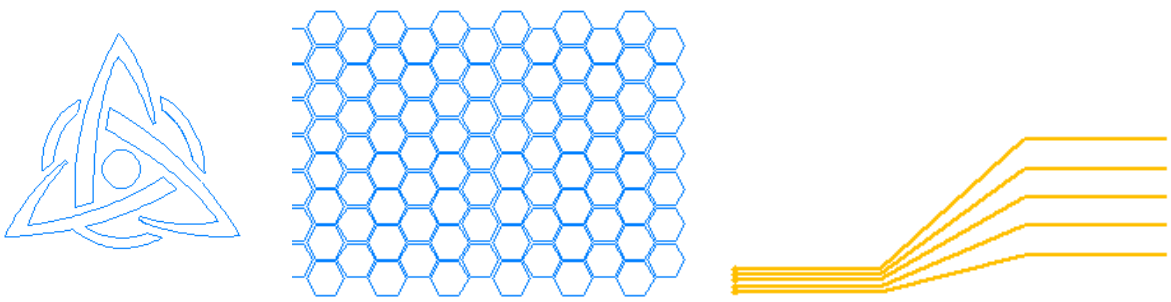
REPORT: W cutting by Laser-MicroJet®

For Anonymous

By Masaki Takano, Synova Japan

TASK
The Laser-MicroJet® technology has been tested for W cut below patterns.

Pattern1 **Pattern2** **Pattern3**

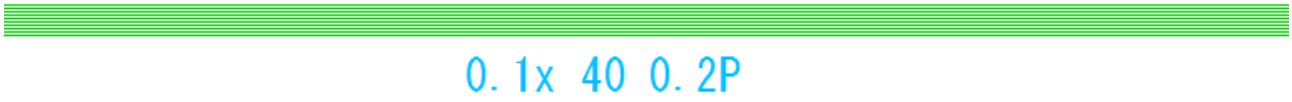


Release of application report			
Project Leader		Responsible Application Group	
Name:	Masaki Takano	Name:	Dr Benjamin Carron
Date:	2012.03.01	Date:	2012.03.14
Visum:		Visum:	

Pattern4 / hole drilling

φ0.1 φ0.2

Pattern5-1 , 5-2 / Tape slit



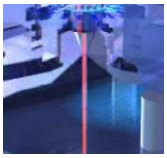
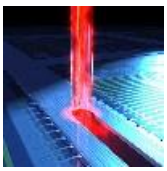
SAMPLE DESCRIPTION AND PREPARATION

SAMPLE 1	Material	W
	Dimension	100x100 *mm*
	Thickness	100 *µm*
	Quantity	1 *pcs*

PROCESS: INSTRUMENT & TEST PARAMETERS
For these experiments, the LDS300M equipped with a green laser has been used as the machine configuration in our lab.

Major advantages of Laser-MicroJet® technology with regards to your application are:
- Cutting of arbitrary shapes
- No chipping on front side, minimal chipping on backside
- Parallel and smooth cut walls

In the table below, the optimized processing parameters used in the experiments are summarized:

	**SYSTEM**	Machine type	LDS300M
	**MICROJET® PARAMETER**	Nozzle diameter	40 *µm*
		MicroJet® diameter	33.2 *µm*
		Water pressure	250 *bar*
		Assist gas	He
	**LASER PARAMETER**	Laser type	L101G
		Wavelength	532 *nm*
		Pulse frequency	8 *kHz*
		Average power	10 *W*
	**CUTTING PARAMETER**	Cutting speed	*1) *mm/s*
		Number of passes	*1)
		Fixture	Vacuum chuck

*1)

	Cutting speed (mm/sec)	Number of passes
Pattern1,2,3,	1	1
Pattern4,φ100um	0.5	20
Pattern4,φ200um	10	20
Pattern5	10	5

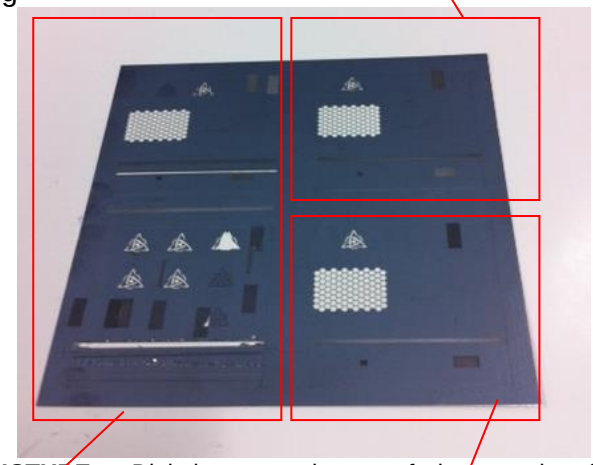
RESULTS

Before cutting

After cutting

Evaluation 01
Pattern1,2,3,4,5-1,5-2

PICTURE: Digital camera image of the sample before processing (bright field illumination; top view)

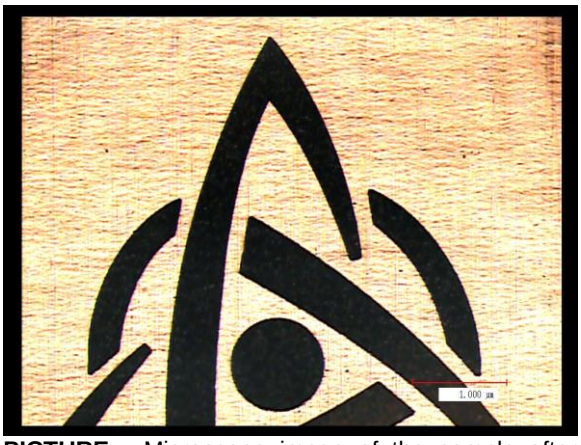


PICTURE: Digital camera image of the sample after processing (bright field illumination; top view)

Test cut area

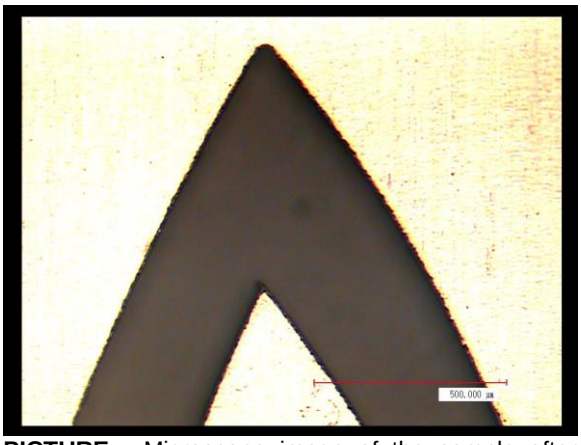
Evaluation 02
Pattern1,2,3,4,5-2,6-2

Pattern1

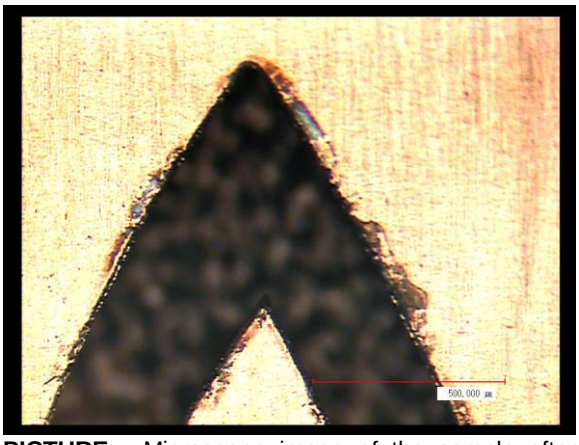


PICTURE: Microscope image of the sample after processing (bright field illumination; top view)

PICTURE: Microscope image of the sample after processing (bright field illumination; back view)

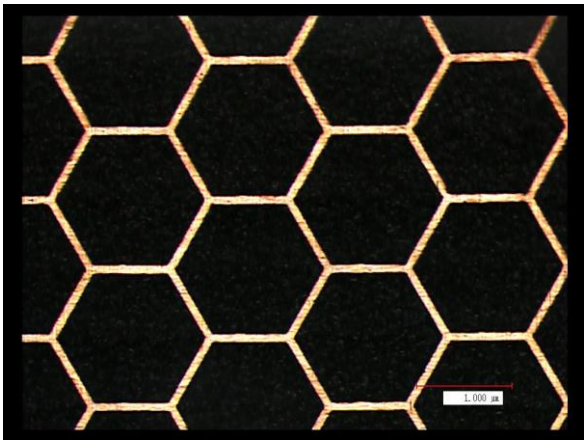


PICTURE: Microscope image of the sample after processing (bright field illumination; top view)

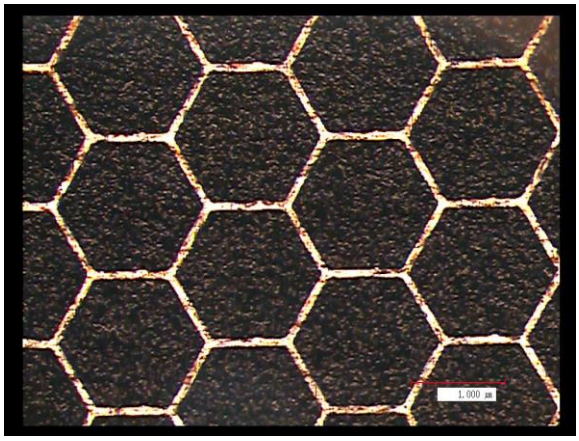


PICTURE: Microscope image of the sample after processing (bright field illumination; back view)

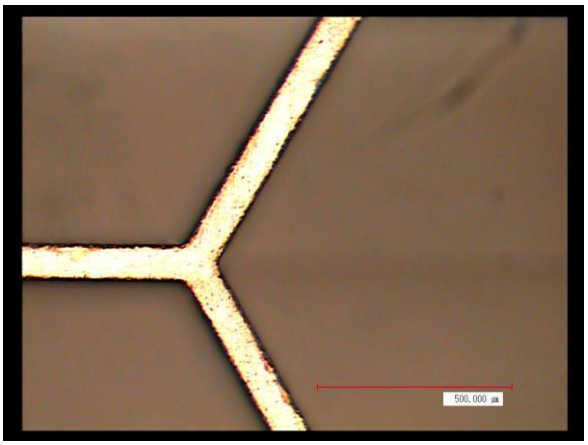
Pattern2



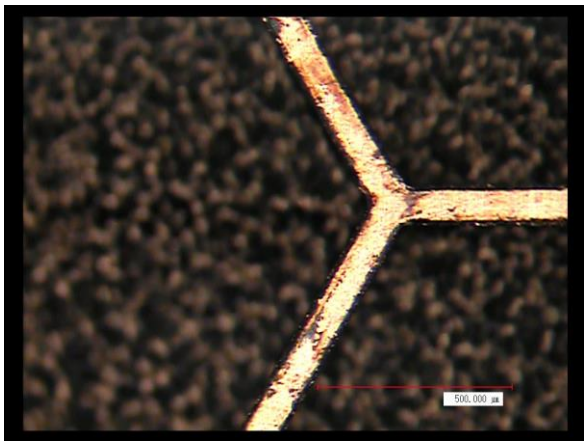
PICTURE: Microscope image of the sample after processing (bright field illumination; top view)



PICTURE: Microscope image of the sample after processing (bright field illumination; back view)

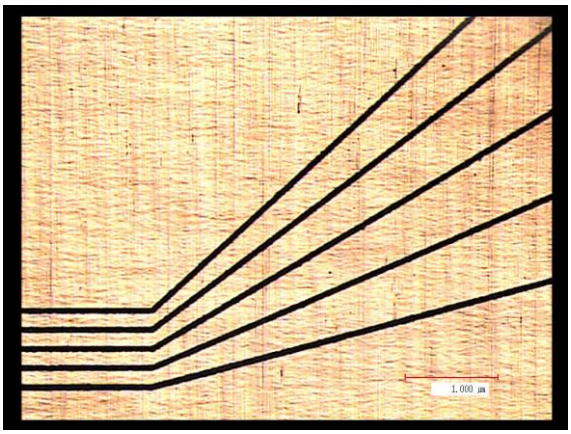


PICTURE: Microscope image of the sample after processing (bright field illumination; top view)

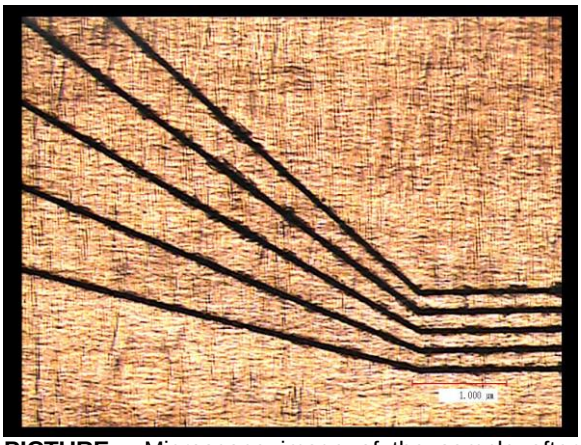


PICTURE: Microscope image of the sample after processing (bright field illumination; back view)

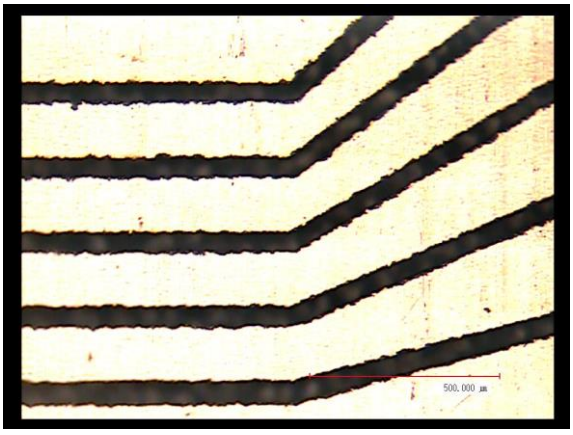
Pattern3



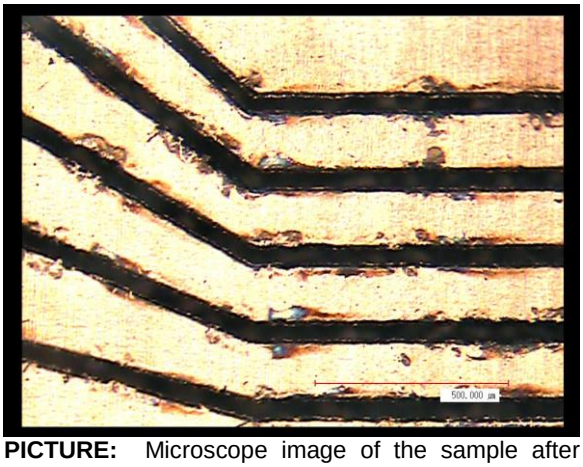
PICTURE: Microscope image of the sample after processing (bright field illumination; top view)



PICTURE: Microscope image of the sample after processing (bright field illumination; back view)

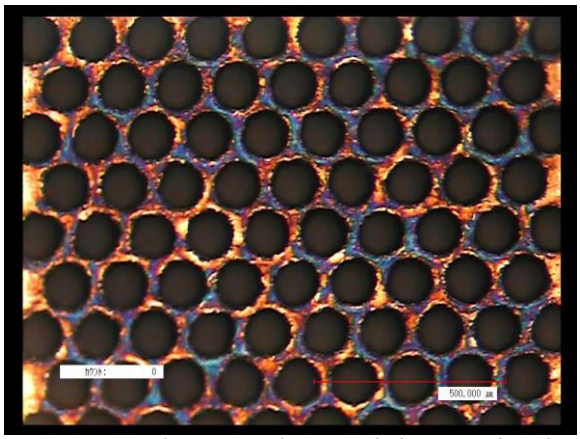


PICTURE: Microscope image of the sample after processing (bright field illumination; top view)

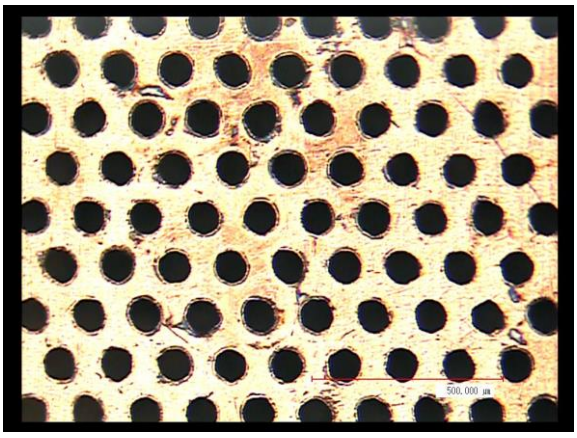


PICTURE: Microscope image of the sample after processing (bright field illumination; back view)

Pattern4
100um holes

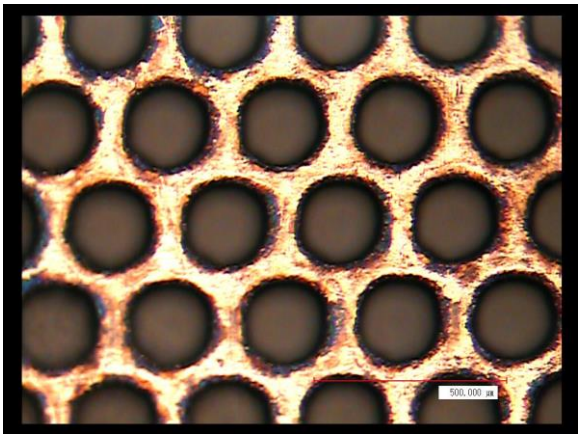


PICTURE: Microscope image of the sample after processing (bright field illumination; top view)

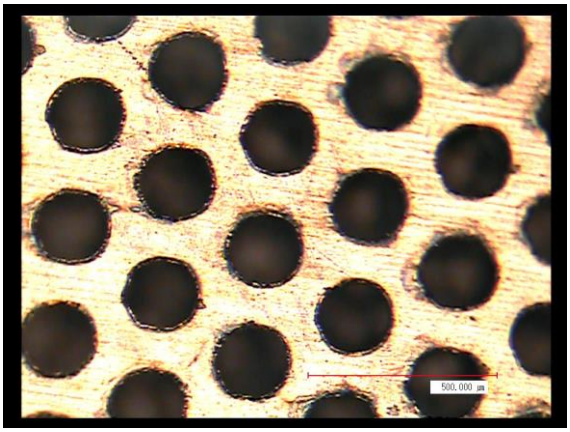


PICTURE: Microscope image of the sample after processing (bright field illumination; back view)

200um holes

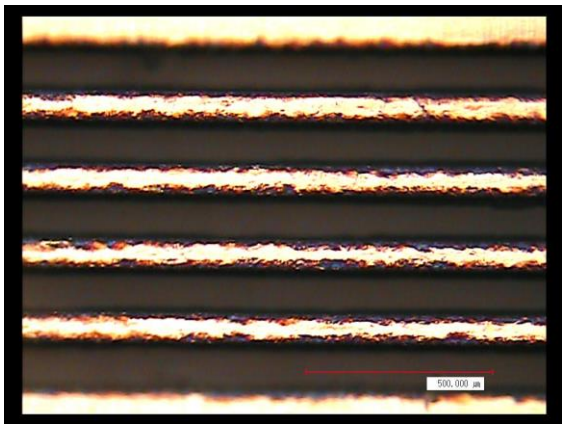


PICTURE: Microscope image of the sample after processing (bright field illumination; top view)

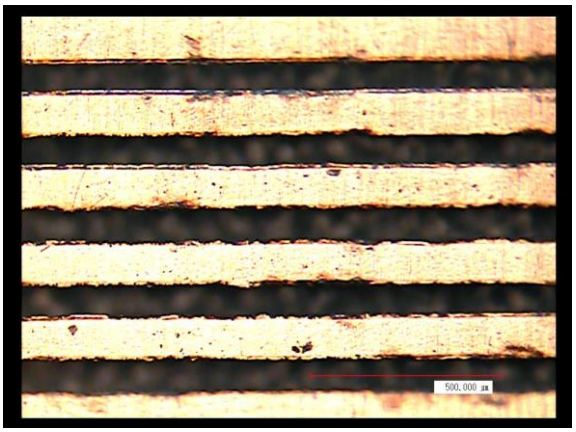


PICTURE: Microscope image of the sample after processing (bright field illumination; back view)

Pattern5



PICTURE: Microscope image of the sample after processing (bright field illumination; top view)



PICTURE: Microscope image of the sample after processing (bright field illumination; back view)

We cleaned this sample plate with ultrasonic bath for 5min after processing.

The table below summarized Anonymous expectations and our results

	What are your priorities? (please put a cross)	Quantified expectations or improvements
• Burr-free:	2	Negligible
• Chipping/Cracks:	1	Neither chipping nor crack

CONCLUSION

The W sample was investigated on SYNOVA LDS300 machine. This machine is based on the MicroJet® technology and combines the advantages the high energy pulsed laser with a hair-thin water jet.

We cut various geometries and the overall quality is good, sharp edge, no chipping and crack, negligible small burr, nevertheless we observed discoloration on the front side of the small holes (Pattern 4).

We thank you for your interest in our technology and we hope our results meet your requirements. Our sales will contact you soon to obtain a feedback about the analysis of these results and to discuss with you the further steps.