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REPORT: Wafer dicing by Laser-MicroJet®

for

Anonymous

by

Mr Stéphane Delahaye; Synova SA

TASK

The Laser-MicroJet® technology has been tested for grooving silicon wafer. For this first evaluation of our cutting process the goal is to evaluate the following topics:

- Feasibility
- Cutting quality
- Process time

SAMPLE DESCRIPTION AND PREPARATION

Anonymous supplied the following material:

Release of application report			
Project Leader		Responsible Application Group	
Name:	Mr Stephane Delahaye	Name:	Dr Benjamin Carron
Date:	05.08.2013	Date:	05.08.2013
Visum:	SDE	Visum:	

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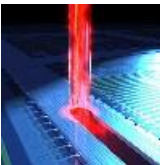
SAMPLE	Material	Silicon and compound
	Dimension	Ø 200 mm
	Thickness	~610 µm
	Quantity	1 pcs

PROCESS: INSTRUMENT & TEST PARAMETERS

For these experiments, the LDS 200 equipped with a short pulse laser has been used as the machine configuration in our lab.

It is a manually loaded clean-room compatible machine, allowing to cut, drill, groove, scribe, trench, mark, or grind different kinds of materials.

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

	SYSTEM	Machine type	LDS 200
	MICROJET® PARAMETER	Nozzle diameter	40 µm
		MicroJet® diameter	~32 µm
		Water pressure	180 bar
		Assist gas	He
	LASER PARAMETER	Laser type	EO21G
		Wavelength	515 nm
		Pulse frequency	300 kHz
		Average power	10 (into the water W jet)
		Pulse width	~18 ns
	CUTTING PARAMETER	Cutting speed	80 mm/s
		Number of passes	3
		Overall speed	~27 mm/s
		Fixture	Vacuum chuck

RESULTS

For this first iteration the highest priority was to optimize the process to get the best cutting quality.

The following microscope pictures give an overview on the quality obtained with the Laser-Microjet® technology.



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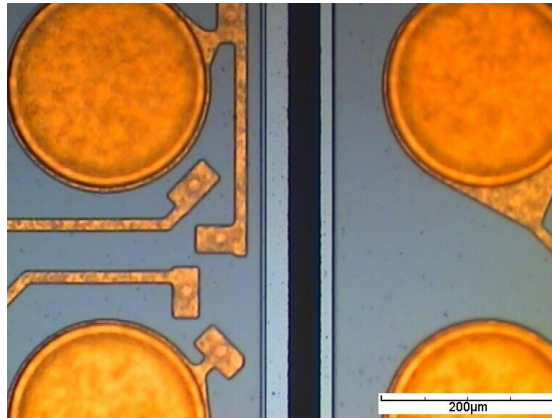
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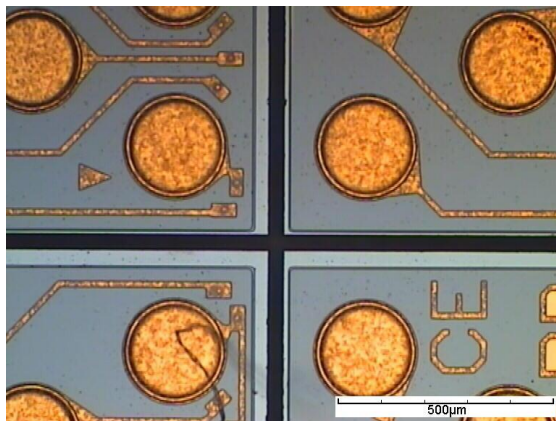
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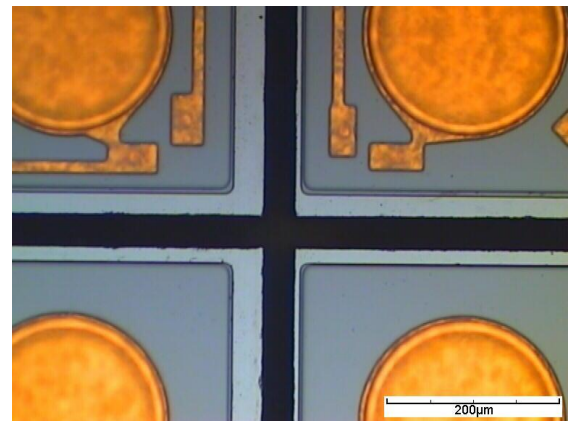
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PICTURE 1: Microscope image of a line (top view)



PICTURE 1: Microscope image of a street intersection (top view)



PICTURE 2: Microscope image of a street intersection at higher magnification (top view).

CONCLUSION

The grooving of silicon wafer was investigated on SYNOVA LDS 200 machine. This machine is based on the MicroJet® technology and combines the advantages the high energy pulsed laser with a hair-thin water jet.

This test shows that:

- A very good cutting quality is achievable with very limited chipping (<10µm).
- The process time can be optimized with further tests and more samples.

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.