The New Generation Laser Dicing Tehcnology for Ultra Thin Si wafer

Masayoshi Kumagai
(Hamamatsu Photonics/Japan)

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New Generation Laser Dicing Technology for Ultra Thin Si Wafer

M. Kumagai, N. Uchiyama, K. Atsumi, K. Fukumitsu, E. Ohmura*, H. Morita

Hamamatsu Photonics K.K.
*Osaka Univ.

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Background

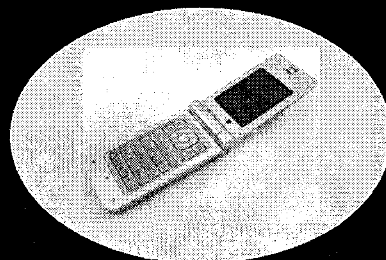
◆INHERENT PROBLEM of BLADE DICING

■undesirable mechanical stress

>It is difficult that dicing processing speed become higher or wafer thickness become thinner.

But, Wafer will be thinner

100 μm ⇒ 50 μm ⇒ 30 μm



>>> **LASER DICING!!**

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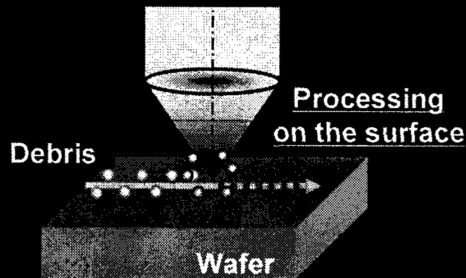
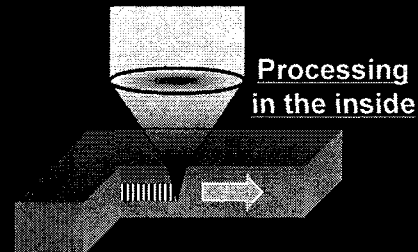
Laser Dicing

Ablation method | **Stealth Dicing (SD)**





- Debris contamination
- Cleaning process
- Cut loss

- No debris contamination
- No cleaning process
- Less cut loss

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Advantages of SD

1. High Speed dicing for thinner wafers without chipping.
2. No debris contaminants and no creating damages on the surface.
3. Completely dry process.

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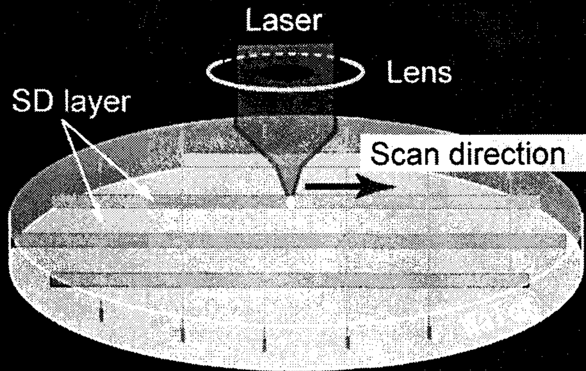
Stealth Dicing Process
(1st Step: Laser Processing)



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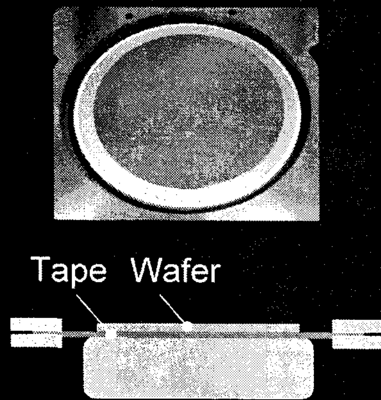
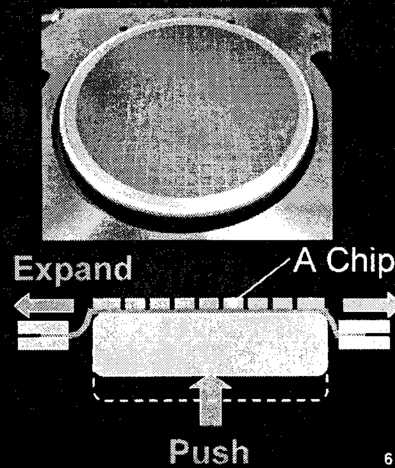
Stealth Dicing Process
(2nd Step: Wafer Separation)

Before tape expansion | **After tape expansion**





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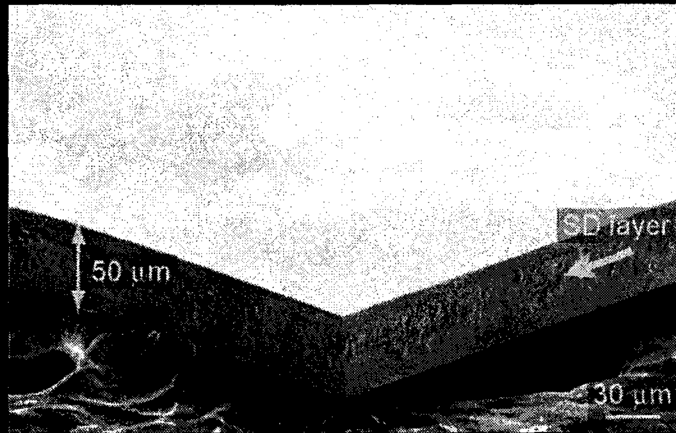
Cutting Edge Quality



SEM image of cutting edge by SD

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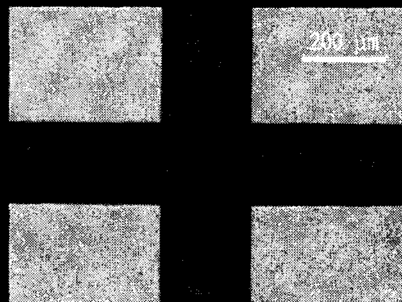
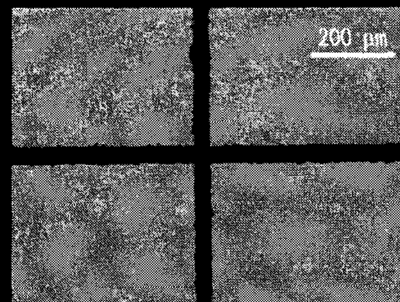
Cutting Edge Quality

■Stealth dicing (top view)



■Blade dicing (top view)



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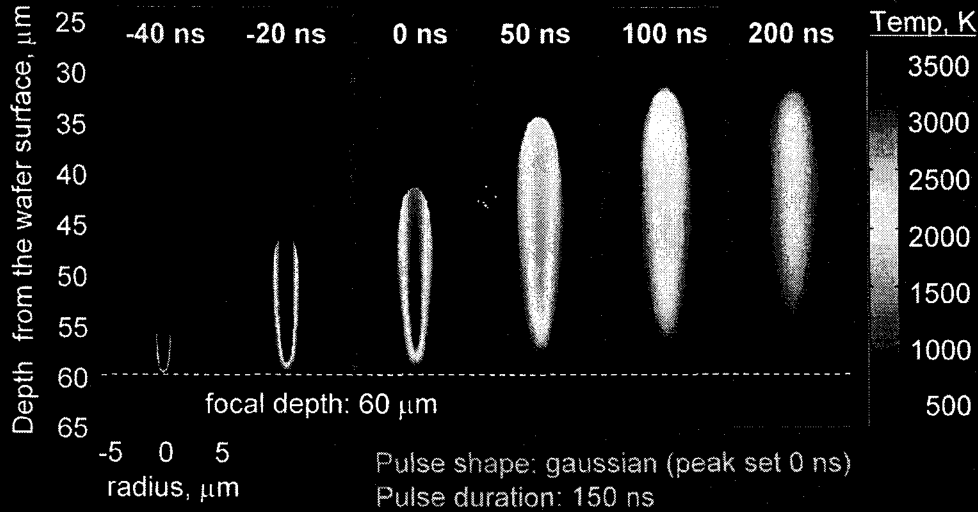
Processing Mechanism



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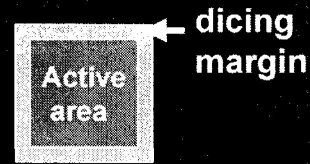
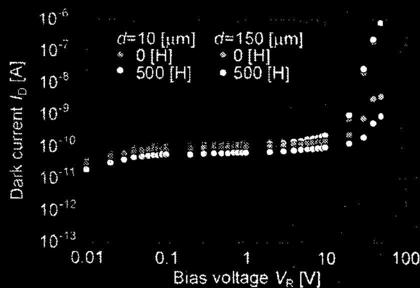
Device Characteristics

- ***BHT test***
  12 [V], 85 [%], 85 [°C]; 0~500 [H]
- ***TC test***
  -55°C~125°C; 0~100 [cycle]

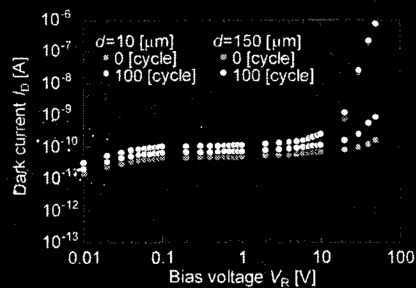
d



BHT test



TC test



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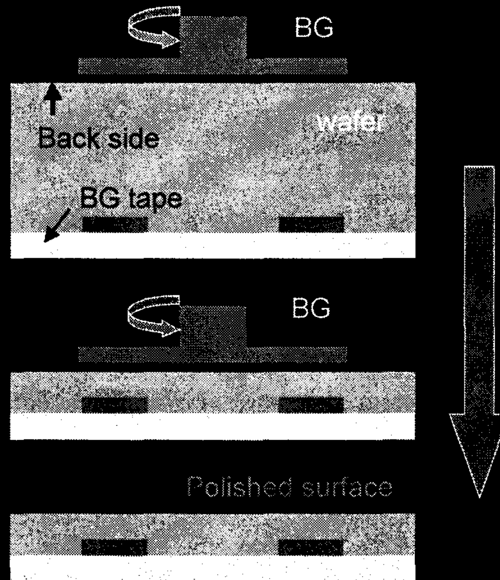
Application for a DAF



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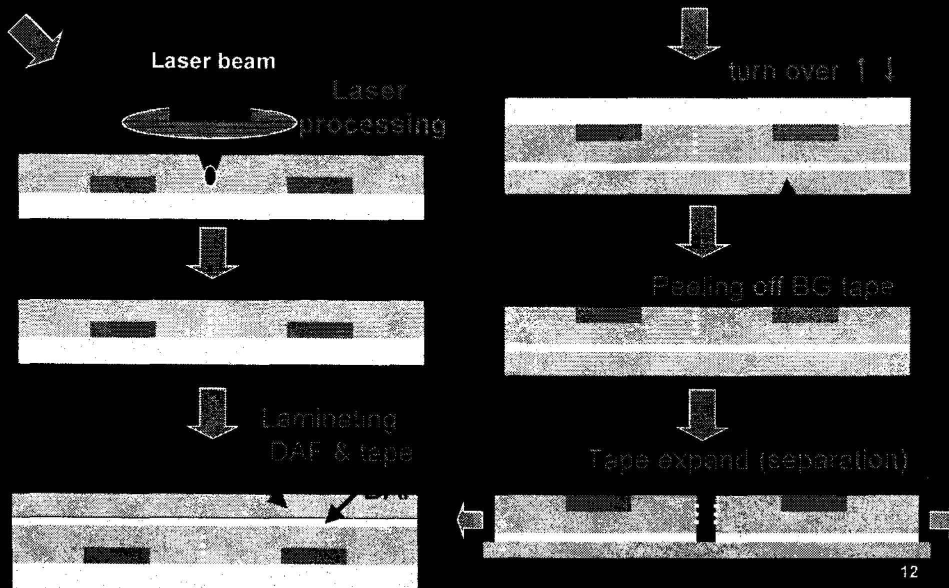
Application for a DAF



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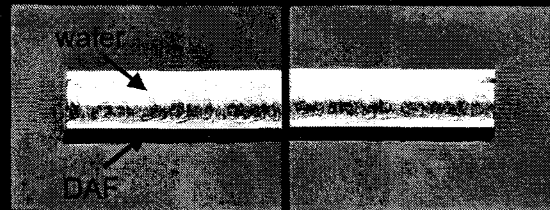
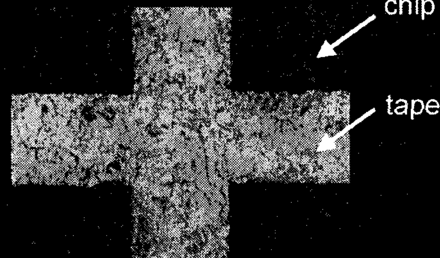


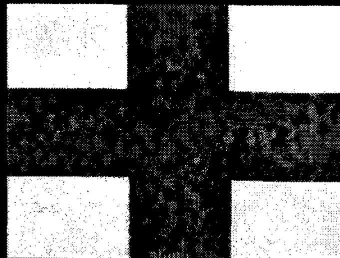
Application for a DAF

- Wafer size : 8 inch
- Wafer thickness: 100 μm
- DAF thickness : 25 μm

Cross Section



Front side



Back Side

chip

tape

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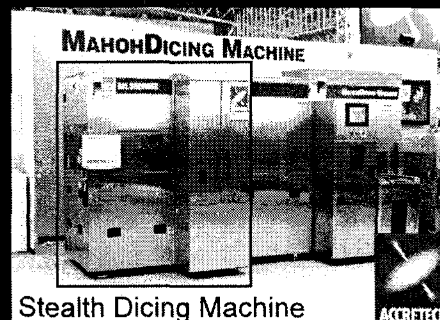
Stealth Dicing Machine

➤ Mahoh dicing machine, which is the brand name of ACCRETECH, is a Stealth dicing machine with built in Stealth Dicing Engine (SDE) which is made by HAMAMATSU PHOTONICS.

In-line system components for 12 inch

- Mahoh Dicing Machine (SDE inside)
- UV Irradiator
- Tape mounter &Tape Expander

*This system is provided by ACCRETECH



Stealth Dicing Machine

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Summary

SDE
Stealth Dicing Engine inside!
HAMAMATSU

Process & mechanism

◆The process consists from two steps which are laser processing step and separation step.

◆The wavelength of laser beam is transmissible wavelength for the wafer. However, inside of Si wafer is processed due to temperature dependence of optical absorption coefficient

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Summary

SDE
Stealth Dicing Engine inside!
HAMAMATSU

Advantage & Application

◆Advantages are high speed dicing, no debris contaminants, completely dry process, etc.

◆The cutting edges were fine. The lifetime and endurances did not degrade the device characteristics

◆A separation of a wafer with DAF was introduced as an application for SiP

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