PUREON

Electronics & Semiconductors

Case study

High performance SiC polishing

SiC wafer

AC700 Lapmaster Wolters

Achievements Eliminate SSP, reduce CMP process time, reduction of rejected wafers.
⟶ Reduce fine polishing time.

Business sector	Electronics & Semiconductors
Application	Lapping and polishing of SiC wafer
Workpiece material	4 inch SiC wafer
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Conclusion

The reduction from 5 to 4 process steps has positively impacted the total process time. In respect to the lithography process step the TTV requirements have been fully achieved.

Workpiece and equipment

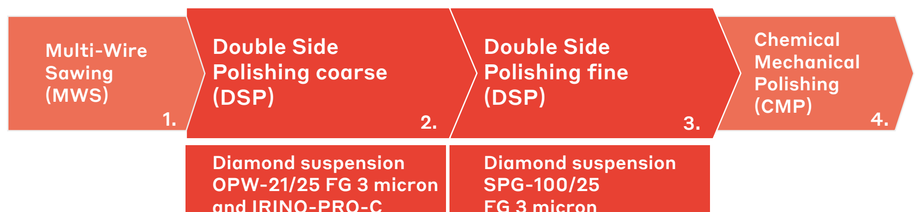
Material .... Silicon carbide
Dimensions .... 4 inch
Machine, plate diameter .... Double side lapping/polishing machine, Lapmaster Wolters (AC700 & AC1200)

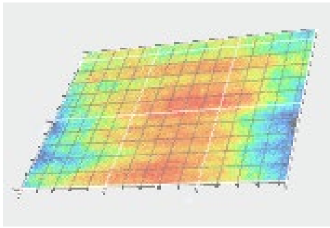
Process description and data

Previous process

Eliminated Step

New improved process





3D view of polished SiC wafer

Roughness profile

Wafer geometry
Wafer diameter 4 inch
Bow +/- 15 micron
Warp 20 micron
TTV 2 micron
LTV max 10 x 10 mm 1 micron

Process data, machine parameters

Step 2

Double Side Polishing (coarse)	Ra (nm)	Rz (nm)	MRR (µm/min)	Cycle time (min)	RPM (c/m)	Pressure (kg/cm2)
OPW-21/25 FG3	5 ± 1	43 ± 14	3.4	40	50	0.25

The main issue of this process is to remove unevenness from wire-sawing, and to generate perfect wafer geometry (in terms of TTV, bow, warp). The new copper-composite plate IRINO-PRO-C allows to achieve high material removal rates, and very fine surface quality in respect to Ra at the same time. In combination with the diamond suspension is OPW-21/25 FG 3 micron a material removal level as high as 3.4 µm/min, while a surface quality of Ra =5 nm is created. As well the subsurface damage is not further increased, but already stepwise reduced.

Step 3

Double Side Polishing (fine)	Ra (nm)	Rz (nm)	MRR (µm/min)	Cycle time (min)	RPM (c/m)	Pressure (kg/cm2)
OPW-21/25 FG 3	1.4 ± 0.1	8.5	0.39	30	20	0.16

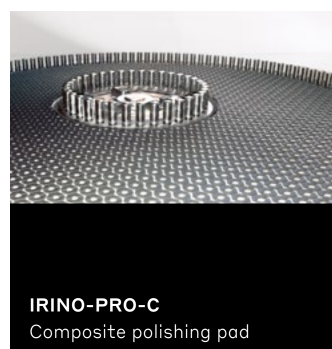
This step uses diamond suspension OPW-21/25 FG 3 micron on polyurethane (PU) pad MHN15A. This process creates a very regular surface as fine as Ra = 1.4 nm ± 0.1 nm and Rz = 8.5 nm ± 1nm, while maintaining a very high removal rate of 0.39 µm/min. Thus, this process is suitable for all those customers, who are interested in a well-balanced process with respect to performance and surface quality.

Additional remarks

- Pureon offers diamond suspension for multi-wire-sawing. The related product is the WSG-52/500 MONO-ECO 3-6 micron. The present case study focusses on the DSP processes.
- Pureon is currently developing an appropriate solution for the CMP process step. This will allow to cover solutions for the whole wafering process.
- CMP processing time can be exponentially reduced with lower Ra incoming wafer.

Pureon products used

OPW-21/25 FG 3 micron
Diamond suspensions



IRINO-PRO-C
Composite polishing pad