DEVELOPMENT AND IMPROVEMENT OF METHODS FOR REDUCING CONTAMINATION OF SILICON-KERF FROM WAFER SLICING

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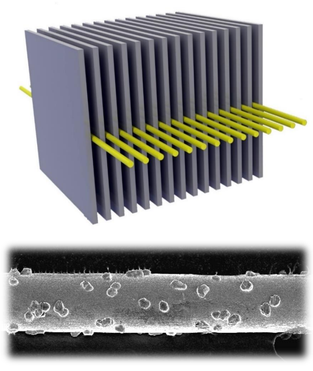
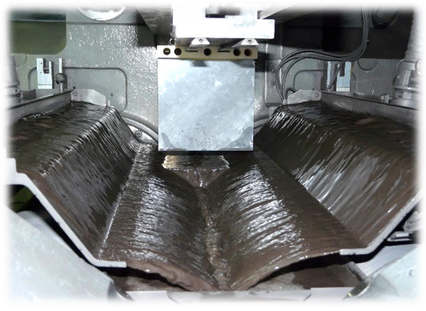
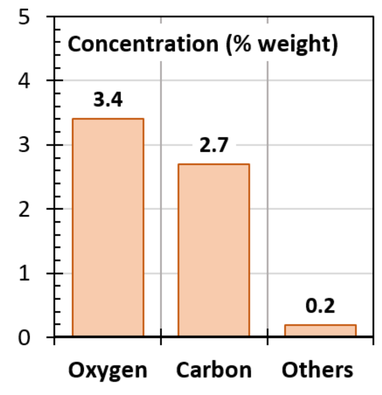
CONTEXT

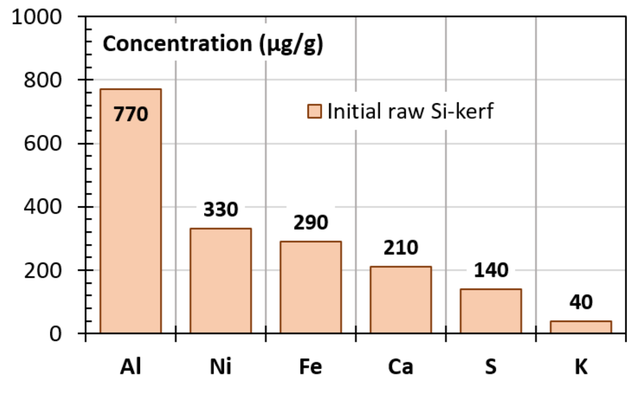
~35% silicon-kerf loss during wafer slicing (diamond wire) ⇒ ***recycling desirable***

Silicon contamination from cutting liquid (water + additives)**, brick holder (beam)** and **diamond wire**





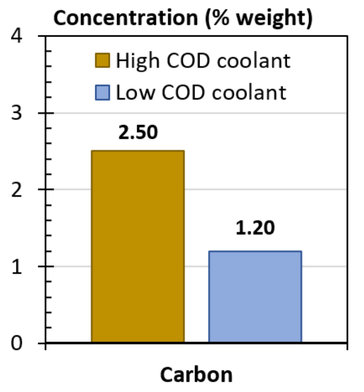


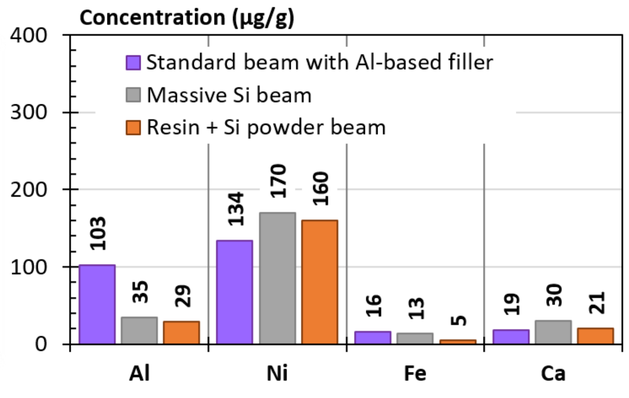


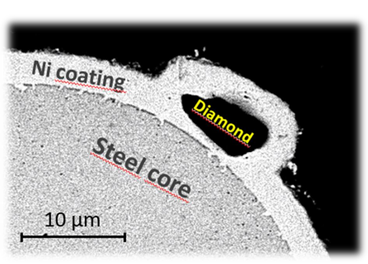
CONTAMINATION REDUCTION OF SILICON-KERF

1) DURING WAFER SLICING

- **Low concentration** (Carbon Oxygen Demand) **coolant** ⇒ ***decrease of carbon***
- **Beam composition** (silicon-based filler) ⇒ ***aluminum reduction***



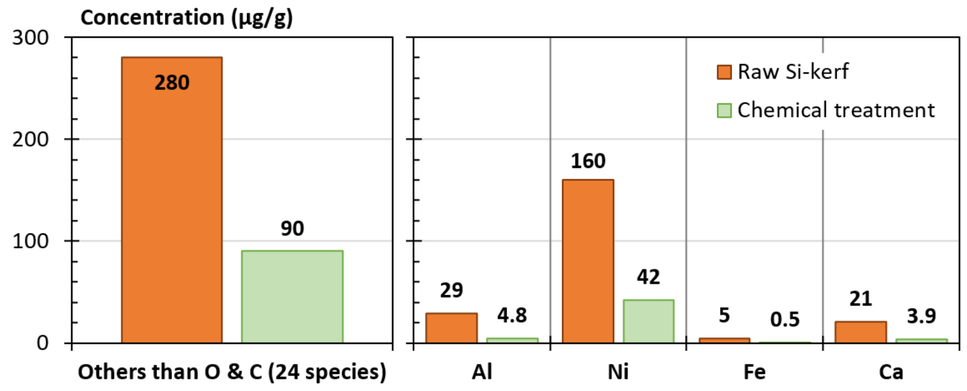


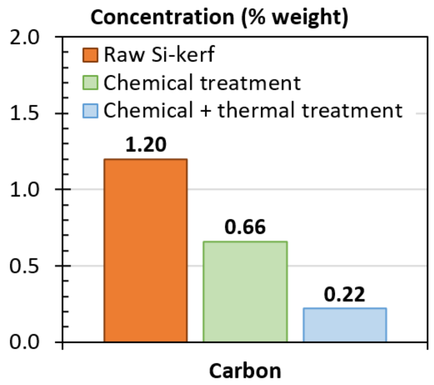


⇒ ***Main residual contaminant = nickel*** (from cutting wire coating)

2) ON DRY RECOVERED SILICON-KERF

- **Soft chemical treatment** (HCl) followed by **thermal treatment** (2 hours @ 500°C)





⇒ ***Metals divided by 3 and carbon by 6 from raw Si-kerf***

CONCLUSION

- Raw silicon-kerf purity can be enhanced to 3N (99.9%, excluding light elements) **without industrial cutting process modification** thanks to cutting liquid and beam composition change
- Additional soft chemical treatment, followed by thermal treatment can drastically reduce carbon concentration and increase silicon-kerf purity to 4N (99.99%)

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