

Bosch Process

What's Bosch Process ?

- ✓ Reactive Ion Etching (RIE) plasma
- ✓ Si & SOI (Silicon On Insulator) Etching
- ✓ Fluorine-based chemistry
- ✓ Alternating etching & deposition steps

Why Bosch Process ?

- ✓ Deep etching (from 2 to 600 μm in Si)
- ✓ Anisotropic (straight edge profile)
- ✓ High etch rate (up to 4 $\mu\text{m}/\text{minute}$ averaged)
- ✓ High aspect ratio ($> 20:1$)

What Applications ?

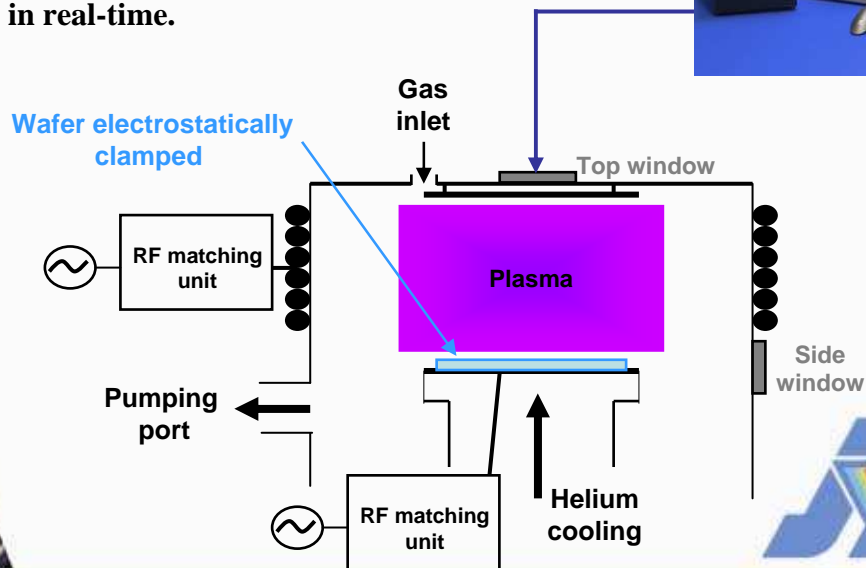
Applications requiring High Aspect Ratio & Deep Trenches, like:

- ✓ High Voltage Integrated Circuits
- ✓ MEMS & MOEMS (switches, sensors, micro-motors, micro-pumps,...)
- ✓ Opto-electronics (optical switches, micro-mirrors,...)

How to control Bosch Process ?

- ✓ Using a Digilem with Twinspot Camera

then, interferometric signal is collected through the top window. One laser spot is placed on the resist, the other one is placed on the material to etch. Combination of both spots result gives mask erosion correction and material depth etched in real-time.



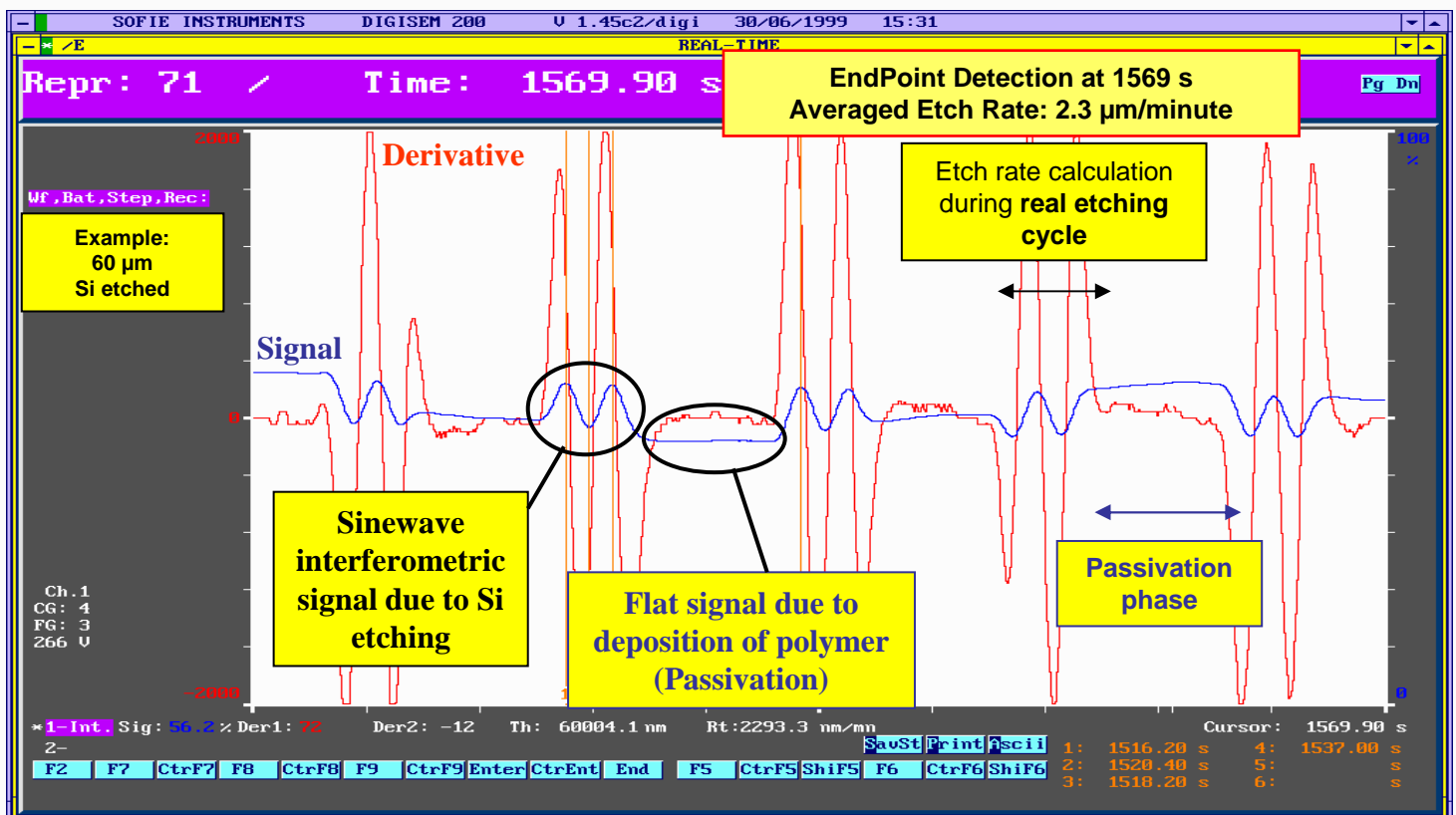


How does real-time results are obtained ?

The resulting signal from the Twinspot interferometric camera is a succession of 2 easily distinct signals: one is a sinewave like signal (due to the etching cycle) and the second is a nearly flat signal (due to polymer deposition during the passivation cycle).

As the detection system is synchronised with the etcher through an hardware link, the Digilem software permits to distinguish the 2 typical phases of the Bosch process.

Also, software allows to take into account the passivation cycles and to remove into calculations those cycles in order to obtain the real-time depth reached.



Conclusion:

Interferometry using a Digilem Twinspot system is an accurate and automatic real-time technique to control Bosch process for deep etching applications.

Such method permits notably to reach target depths from 10 to 400 µm in Si, with an accuracy better than 0.5 %.

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