Silicon Carbide Single Wafer Epitaxial Reactor

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Historical facts

1972

- Preti Engineering (now LPE) designed and manufactured the first silicon Epitaxial Reactor in Europe.
- Almost 50 years later LPE reactors are still the preferred tools to grow EPI layers for discrete and Power Applications.
- Approx. 400 reaction chambers for Silicon and Silicon Carbide epitaxy are in operation in more than 30 semiconductor companies.
Actual facts

- LPE Italy
  - Product development: Milan
  - Process development: Catania
- LPE China: Sales and Technical service
- Employees
  - 60 people worldwide
  - 10 people in Innovation

Sales distribution 2006-2017

- China 53.8%
- Asia 19.1%
- Europe 20.9%
- USA 6.2%
The opportunity: Silicon carbide
An exploding market
Silicon Carbide

• Started R&D activities in 2001

• Moving slowly in R&D for 8 years

• Sold three systems in Japan for R&D and Process development

...lost in the DEATH VALLEY

• ENIAC 2009 call: the PO for the project LASTPOWER was presented
ENIAC - LASTPOWER

• Large Area silicon carbide Substrates and heTeroepitaxial GaN for POWER device applications: LAST POWER

• Start: 01.04.2010 – End: 30.09.2013
• 13 Partners: 2 LE – 4 SME – 7 RE from 6 Countries
• Scope: Development of equipment, materials and devices for SiC and GaN
• Budget: 16M€

• Goal for LPE: Development of an epitaxial reactor for Silicon Carbide for pilot lines and pre-production
Output of LASTPOWER

**PE 106**

- Single wafer SiC epitaxial Reactor
- Adoption of Chlorinated chemistry
- Growth rate 10x higher
- 150mm diameter
- > 100µm epi thickness
- Fully automated using robot

- First on the market having above features
....then?

DEATH VALLEY
was crossed
...what next?

• Historical Average sales : 20 M€
• 2018 Guidance : 40-50 M€
• Silicon vs SiC share forecast : 70/30

• Expected significant SiC sales after 2020, with peak in 2023
Future activities in Silicon Carbide

- PE 1O6
  - Automated Cassette-to-Cassette
  - Continuous Improvement Program

- ECSEL project: REACTION
  - Start: November 2018
  - LPE Object: Development of a 200mm epitaxial reactor for silicon carbide
End of the story: and...
Grazie