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From fundamental research to industrial sector : what opportunities ?

Fabien Deprat – 07/08/2021

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We are creators and makers of technology

- One of the world's largest semiconductor companies
- 2020 revenues of **$10.2 B**
- **46,000** employees of which **8,100** in R&D
- Over **80** Sales & marketing offices serving over **100,000** customers across the globe
- **11** Manufacturing sites
- Signatory of the United Nations Global Compact (UNGC), Member of the Responsible Business Alliance (RBA)

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As of December 31, 2020

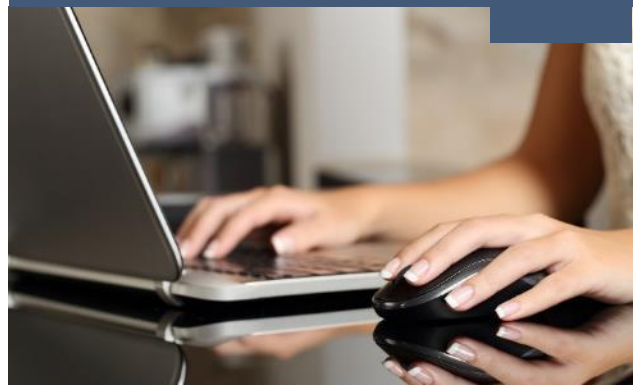
We address four end markets

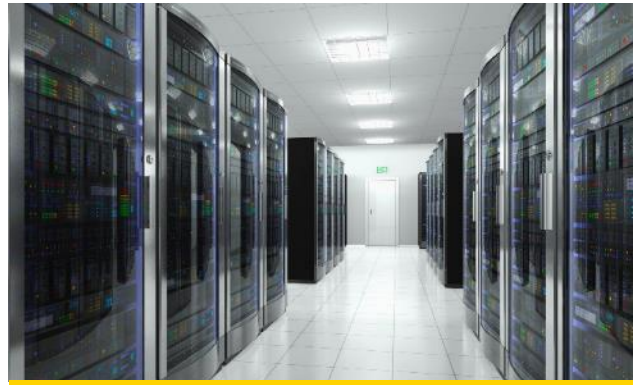
Automotive

Industrial

Personal electronics

Communications equipment, computers & peripherals





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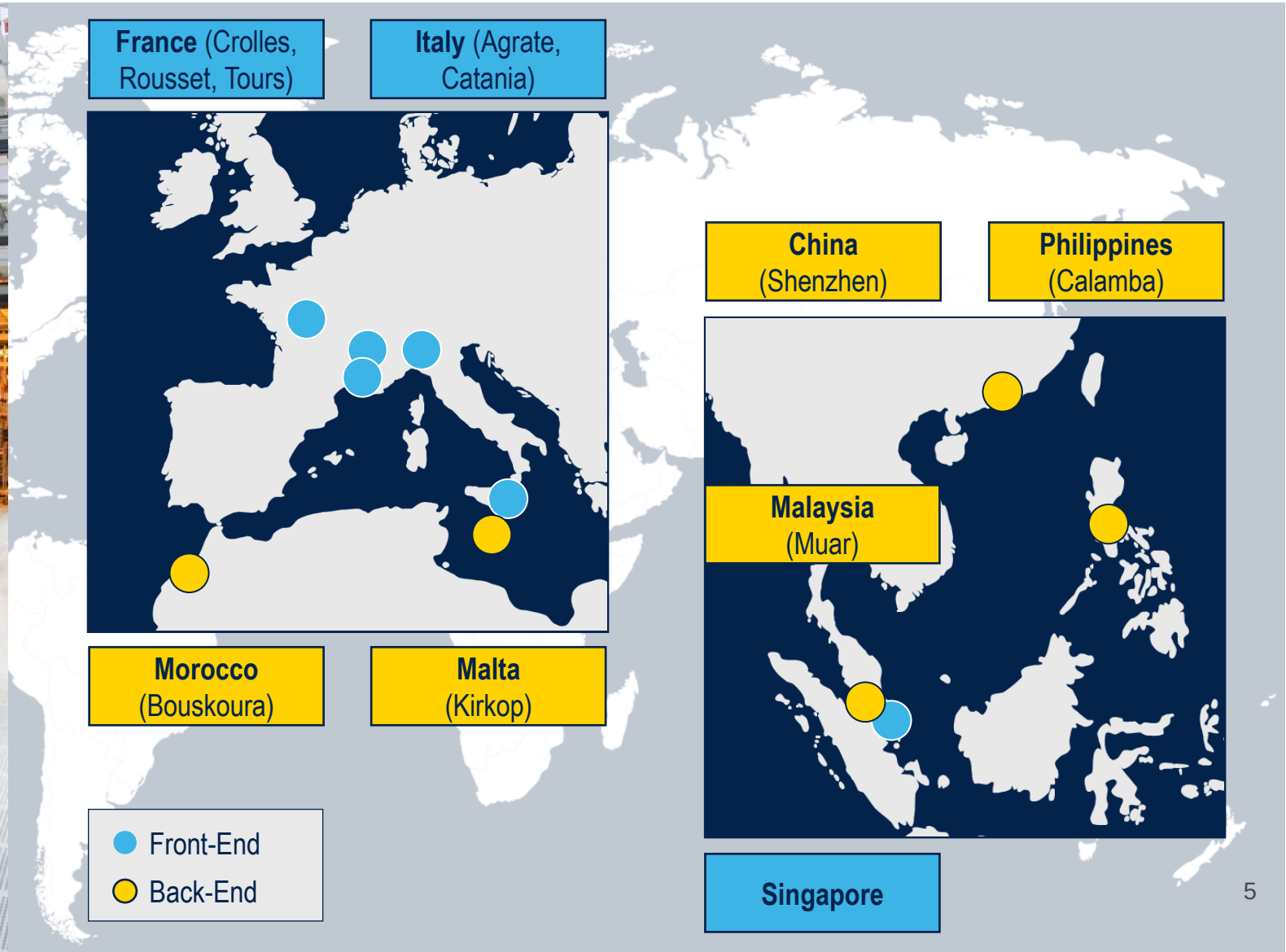
11 Manufacturing Site



We are drivers of your innovation

Advanced R&D centers around the world for close collaboration with operations and customers

- **~18,000** patents &
  557 new filings in 2020
- **~15%** of revenues invested in R&D
- **~8,100** people working in R&D and product design

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Curriculum vitae

Engineering school

- Electronics
- Programming
- Physics

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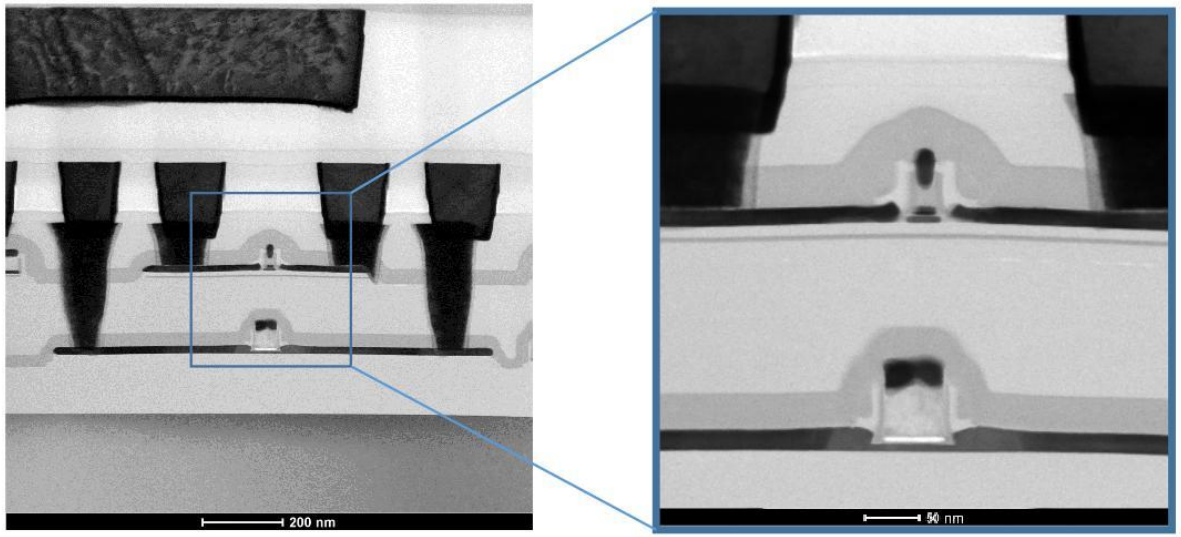
Ph.D in CEA Grenoble

- 3D sequential integration (known as CoolCube®)



[From Press]

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R&D Epitaxy in STMicroelectronics

- Team of 9 peoples
- 8 tools
- RP CVD (4 tools)
- AP CVD (4 tools)

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My role in the company

1. **Develop Epitaxy process for R&D technology by Reduce Pressure CVD**
   - SiGe or Si
   - Dopant (As, P or B)
   - Selective or Non-selective

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   - Patent deposition
   - Solution provider
   - Advanced process development
     - Own work
     - Student management (Ph.D. and internships)

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3. **Operational task**
   - Several hundred of steps to process a device → Manage the process of R&D wafers for RP-CVD epitaxy steps

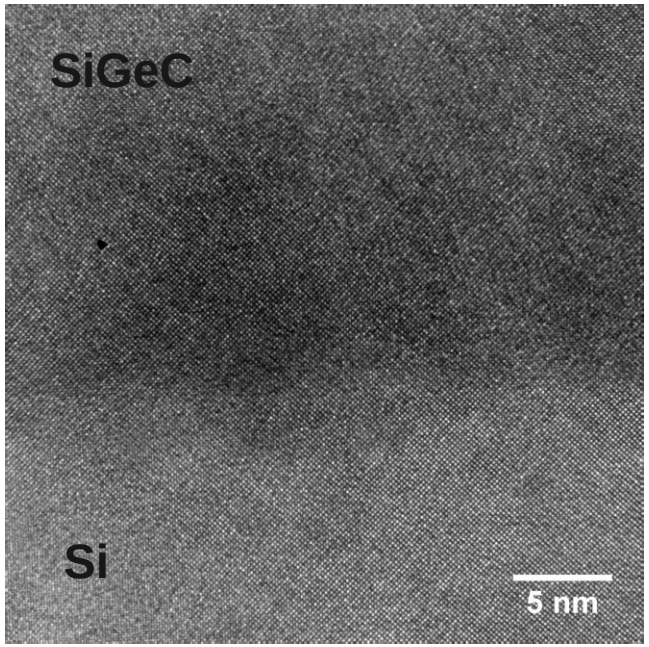
Link between industrial and academic research

- Academic research is important for industries !
  - Not all the competences are available in a company (too expensive or punctual need)
  - Industry : Majority of new products are based on customer wishes or needs → Fundamental research is not the priority
- Academic research and industrial research are complementary
  - Exchange is needed (discussion, project…)
    - Academic research : integrate their researches in a field of application
    - Industrial research: discover new potential solutions (material, devices, characterization…)

One example

- Collaboration with IM2NP laboratory (Marseille, France) via Nano2022

High Resolution TEM



« See the atoms »

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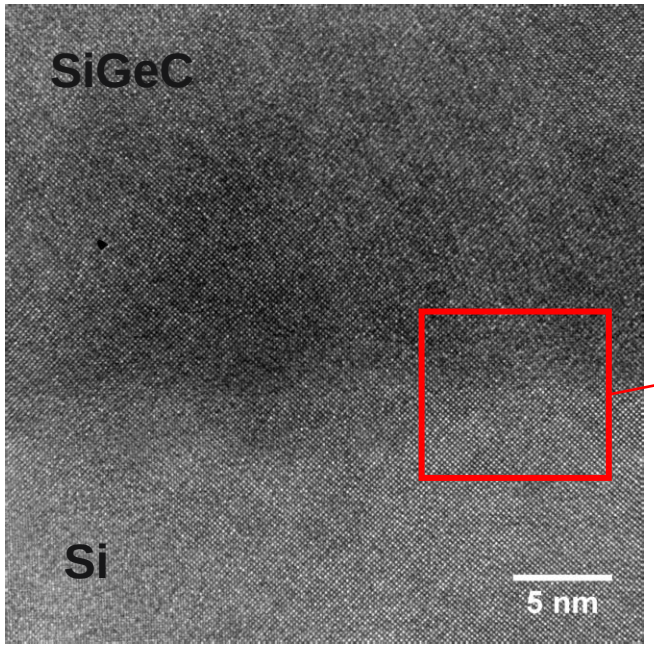
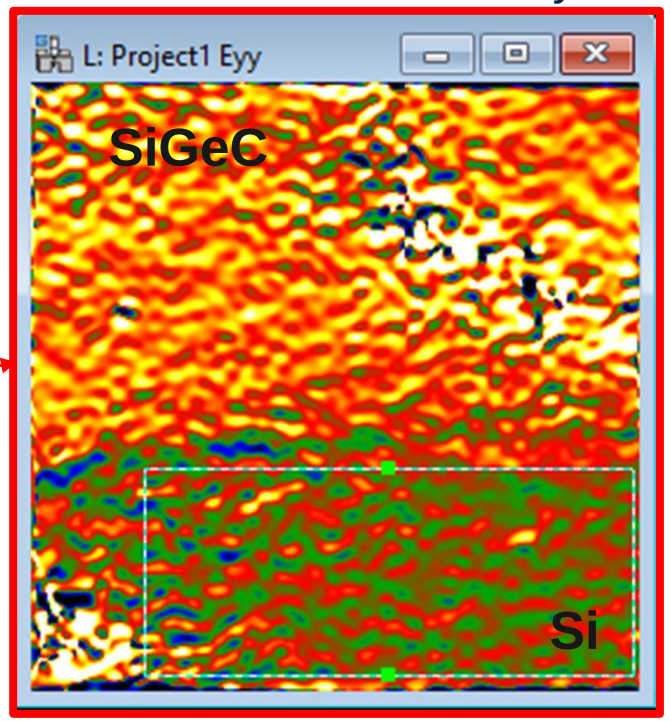


Geometrical Phase Analysis



- Quantitative lattice deformation
- Map the strain
- Si : no strain (ref)
- SiGeC : strain

Sligth non-homogenous strain in the Reference sample

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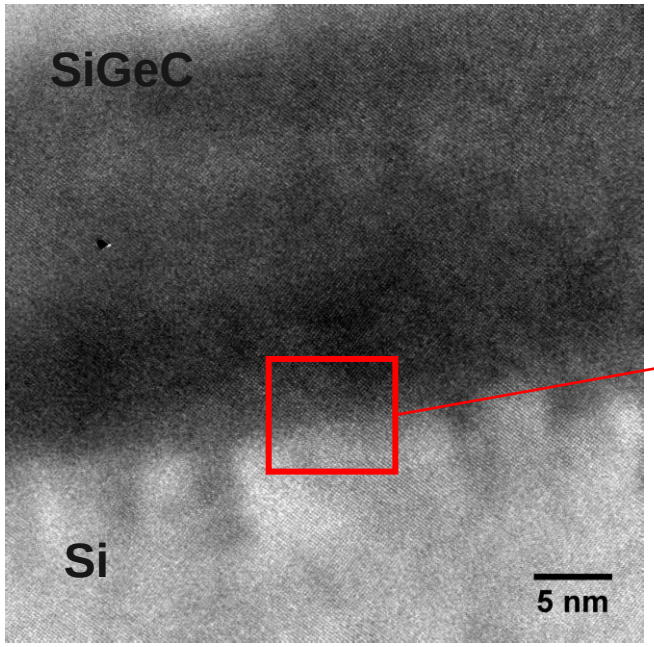

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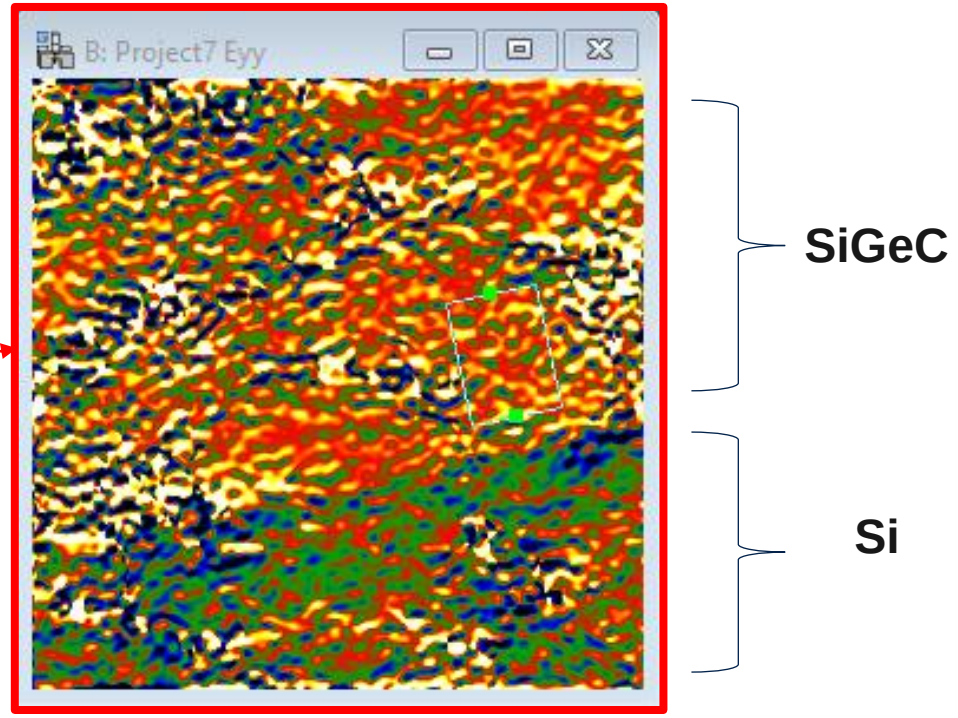

Strong non-homogenous strain in the sample → Improvement is mandatory to increase device performances !

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Academic researcher can work in the Industry → Ph.D. or Post Doc

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- Work in a different area than semiconductor !
- Semi-conductor : know the market !

Press articles on internet

TECH

TSMC says plans to invest $100 billion over next 3 years to meet chip demand

PUBLISHED WED, MAR 31 2021•11:35 PM EDT | UPDATED WED, MAR 31 2021•11:46 PM EDT

TSMC announced plans in May to build its own $12 billion factory in Arizona, in an apparent win for the administration of former U.S. President Donald Trump that was pushing to wrestle global tech supply chains back from China.

Rival Intel said this month it will build two new factories at an existing campus in Arizona to make its own chips but also open them to outside customers in what is called a "foundry" business model in the chip industry.

Press articles on internet

Pourquoi STMicroelectronics booste ses investissements jusqu'à 2 milliard de dollars en 2021

« Nous nous préparons à un doublement du marché »

ÉRIC GERONDEAU
Directeur du site
de STMicroelectronics
à Crolles (Isère)

qui a confiance dans les équipes de Crolles et qui investit dans l'expansion du site. Cela s'est traduit par la création de plus de 250 postes

l'expansion du site. Cela s'est traduit par la création de plus de 250 postes en CDI en 2020, malgré la période d'incertitudes. Et nous prévoyons d'embaucher cette année plus de 200 personnes en CDI, en majorité dans les opérations industrielles et la R&D.

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Press articles on internet

- More examples

MNE Tax

US Senate approves bill with R&D funding for semiconductor ...

The bill, dubbed the U.S. Competition and Innovation Act, includes USD 50 billion in appropriations for semiconductor manufacturing and R&D ...

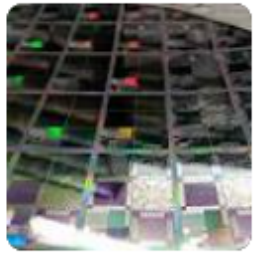
Il y a 3 semaines

TechSpot

Japan wants to reignite its once-dominant silicon industry

The big picture: Japan's share of global semiconductor sales has gone from 50 percent in 1988 to less than 10 percent today. The country has ...

Il y a 8 heures



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Semiconductor industry

- Quick expansion of the semiconductor industry
  - New technologies
  - Intelligent home, car
  - Phone…
- Opportunity in the world
  - China (technological war with USA)
  - Agrate (Italy, STMicroelectronics)
  - USA

STMicroelectronics

- https://stcareers.talent-soft.com/

- 1100 permanent job propositions and around 100 in R&D area (design, process or technology development)

Thank you

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