Brolis Semiconductors

Case study

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BROLIS SEMICONDUCTORS

BEYOND STATE-OF-THE-ART TECHNOLOGY
FOR INFRARED APPLICATIONS

Story

BSc Electronics
Lithuania

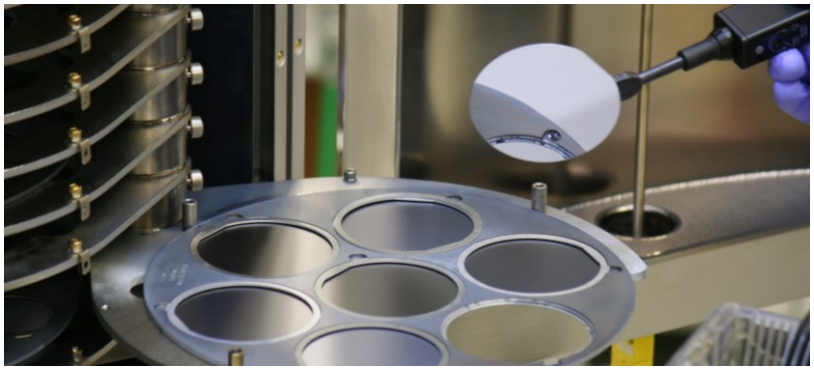
MSc Nanotechnology
Sweden

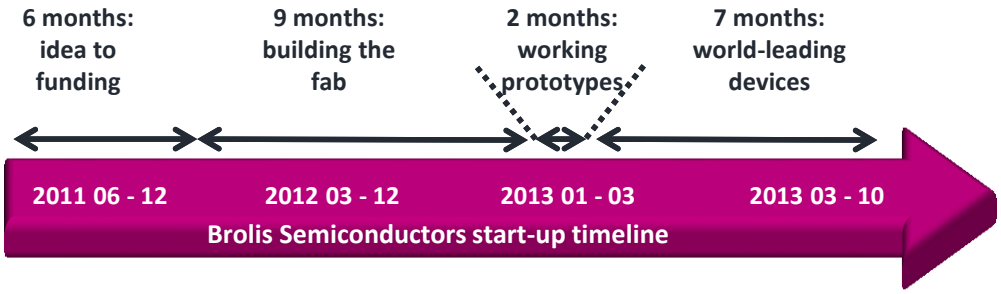
PhD Semiconductors
Germany

MSc Management
Belgium

Brolis Semiconductors affair:

- Three brothers;
- Elite European education;
- Leading scientific results;
- Successful lab to fab conversion;
- Market-ready cutting-edge technology;





Company

Brolis Semiconductors UAB
Molėtų pl. 73
LT-14259 Vilnius
Lietuva
www.brolis-semicon.com

Brolis Semiconductors BVBA
Bollebergen 2B
9025 Zwijnaarde/Ghent
Belgium
www.brolis-semicon.com

Brolis Photonics Solutions LTD
Willowbank Business Park
Larne, County Antrim, BT40 2SF
Northern Ireland, UK
www.b-photonics.com

Business:

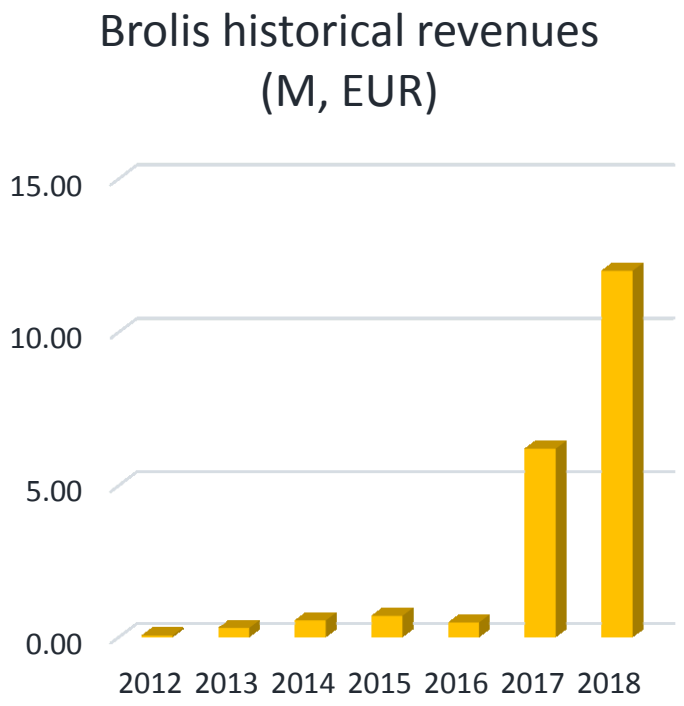
- Laser diodes (0.8 – 3.5 μm)
- E-O systems for defence & security
- GaSb/SOI photonic integrated circuits

Factsheet:

- Company established in **August, 2011;**
- Number of employees : **23** (2017)
- 210 m^2 state-of-the-art cleanroom facility
- ISO 9001:2015
- Revenues: 6.5 M EUR (2017)
- Order book: 20 M EUR (2018 – 2021)
- IP portfolio: 2 US patents granted, 3 pending

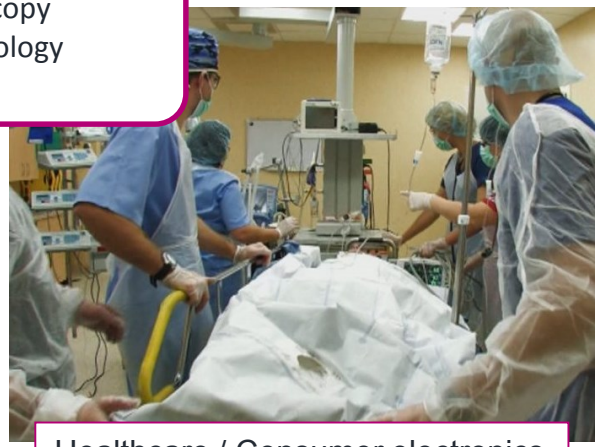
History

- 2011 m. spin-out from TU Munich, Germany
- From IDEA to the START of operations – 18 months
- From LOSS to PROFIT – 4 years
- Total investment over 10 M EUR



Target markets

Laser diode based:
- Spectroscopy
- Dermathology
- Surgery



Healthcare / Consumer electronics

- Covert surveillance
- Warrior systems
- DIRCM
- NIR, SWIR, Thermal

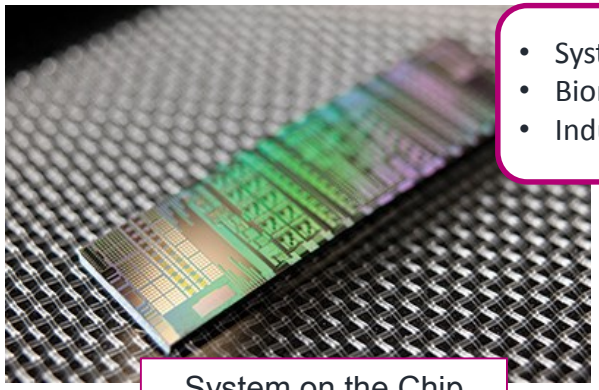
Defence & Security

Unique technology platform for IR wavelength range

From material synthesis to final solutions

- Ex-SWIR spectral range (1.7 – 3.5)
- Industrial scaling
- Developed and manufactured from **A to Z in Lithuania**

- System on the chip
- Biomedical sensors
- Industrial sensors



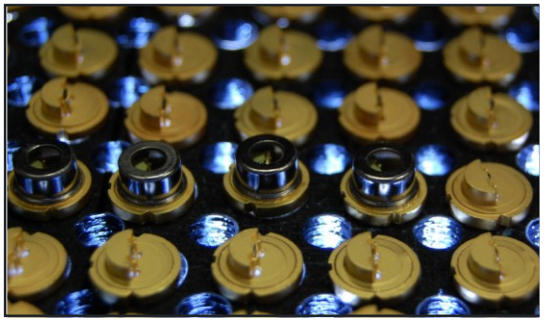
System on the Chip
(Lab on the chip)

Business model: vertical integration

- Multi-wafer MBE wafer growth
- High-throughput backend technology
- System integration and assembly

Wafer

Component

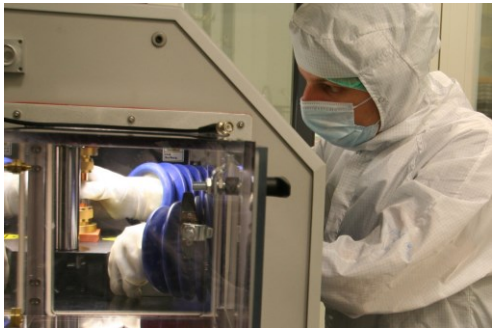


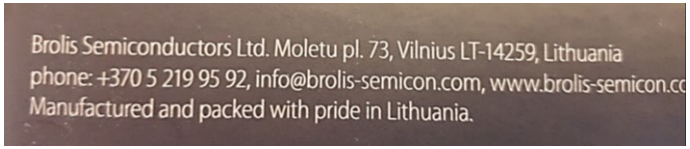
System

From **NIR** – through **SWIR** – to **MIR**

0.8 µm 1.5 µm 3 µm λ

Technology: production – assembly – full product qualification





Financial instruments used

- Nr. VP2-1.3- ŪM-02-K-03-047
- Intelektas LT (“soft”)
- 2012 – 2015
- Total project value: 944 402 EUR (EU part: 414 026 EUR)

- VP2-1.3-ŪM-03-K-03-002
- Intelektas LT+ (hardware)
- 2012 – 2013
- Total project value: 3 073 663 EUR (EU part: 2 151 564 EUR)

EP2-1.3-ŪM-03-K-04-003
- Intelektas LT+ (hardware)
- 2014 – 2015
- Total project value: 1 630 888 EUR (EU part: 752 736 EUR)

EUROSTARS-2
- E!10051 SWIRSENSE ranked #6 from ~300 projects from 34 countries
- 2016 – 2018
- Total project value: 380 000 EUR (EU part: 300 000 EUR)

Total financial aid: ~ 3.6 M EUR

Financial instruments

- Intelektas LT+, LT excellent instrument for hardware funding
- BUT not for start-ups – financial backing requirement.
- Brolis had to raise VC money to become eligible for the instrument
- VC money hard to get and most expensive in the industry
- Also a bureaucratic burden focusing on processes not the essence
- Expert reviews at times were very amateur – lack of expertise!

- Eurostars-2
- Application/review and examining is through Brussels
- International independent expert review – found remarks very valuable
- Project progress status reports – directly to EUROSTARS (MITA on cc)
- Additional bureaucracy in Lithuania – translate the same progress report with more details
- Additional review (of WHAT and by WHOM?)
- Partners in Switzerland have 0 extra bureaucracy vs Brolis having double and 3 months delay in funding.

High-tech intellectual property protection

- PATENTS are vital to protect and monetize value of know-how and technology
- PATENTS are EXPENSIVE
- PATENTS also protect the investments into the technology (relevant for FI)

- Since 2012, Brolis has 2 US patents granted and 3 more filed
- Total money spent up to now: **200 kEUR**, or ~ **40 kEUR/patent**
- For SME's this is very expensive, therefore a relevant FI is necessary

- Until 2017 no long-term FI existing, or existing FI's excluded US patents (???)
- In 2017 INOPATENTAS was introduced

- **INOPATENTAS:**
- **US patent included (+)**
- **Max funding amount/patent: 30 kEUR (+)**
- **Max funding intensity: 80 % (+)**
- **Upper limit for PA hourly rate: 120 EUR/h**

This kills the entire FI!

High-tech intellectual property protection

- Patent attorney (PA) qualification are absolutely essential for the quality of the patent
- Preparing a US patent it is a good idea to work with US IP firms
- PA must specialize in a narrow field and be field-specific
- At Brolis we changed 4 IP firms in DE, UK, LT and US to find a suitable firm for our field

Market prices for a PA are:

- Top level IP firm in US: **750 EUR – 1000 EUR/h**
- Average level firm in DE, BE, UK: **500 EUR/h**
- Where does the 120 EUR/h come from?

Patent costs ~ 40 000 EUR

Up to 5000 EUR
Filing fees, etc.

35 000 EUR
Pattent attorney

	INOPATENTAS	ACTUAL
Max amount	30 000	40 000
Max intensity	80%	<20%
PA rate	120 EUR/h	1000 EUR/h

This instrument will never result in anything
Money will be spent

Financial instruments: resume

- Good FI ideas but no communication/feedback with end-user
- Early stage business is left on its own in LT
- Duplication of EU bureaucracy and failing at doing so kills the FI
- Lack of local expertise leads to poor project review quality
- Lack of long-term FI's for priority fields
- There are so many good working examples in other countries – have a look
- When creating rules of specific FI, PLEASE talk to **end users**

Thank You!

www.brolis-semicon.com
www.b-photonics.com