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Integrated Photonics Sensing – The Impact on Endoscopy

A E R O S P A C E | M E D I C A L | H I G H - T E C H | E N E R G Y

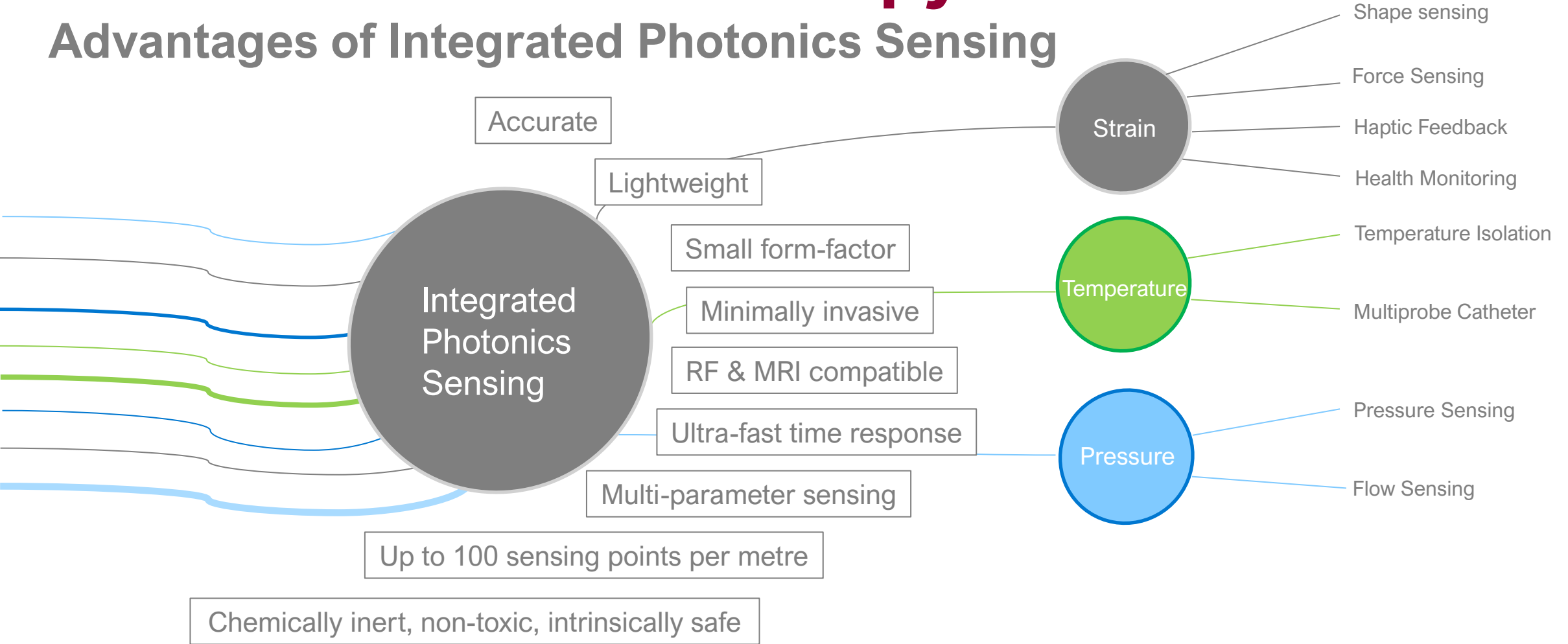


Technobis HQ, Alkmaar, Netherlands
12+ years experience of Integrated photonics
Expanding to 160 employees

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Technobis and Endoscopy

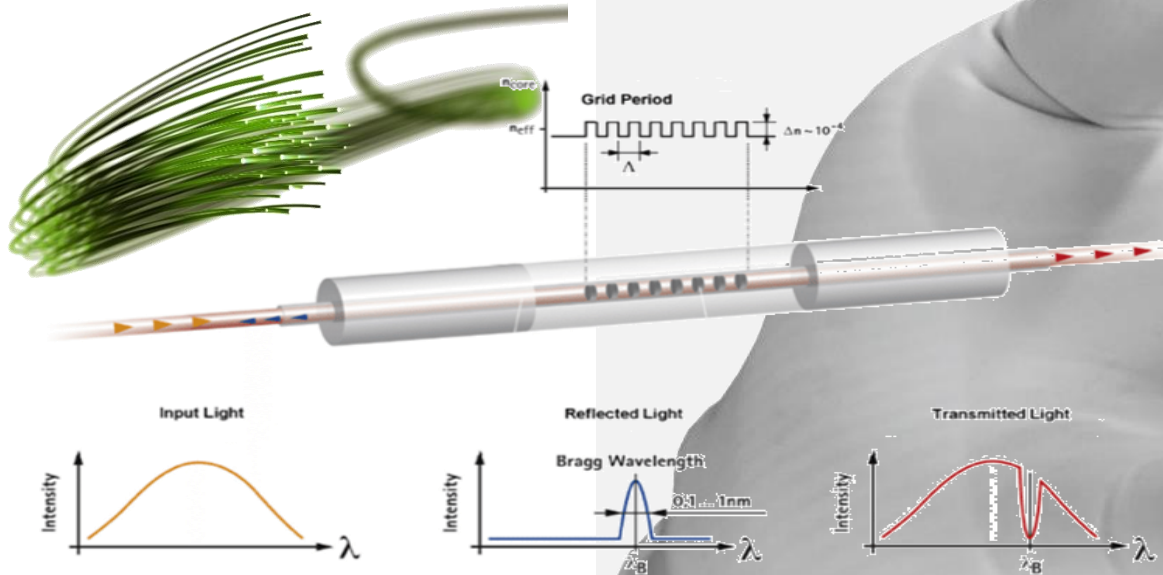
Advantages of Integrated Photonics Sensing



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Integrated Photonics Sensing

Gator Platform



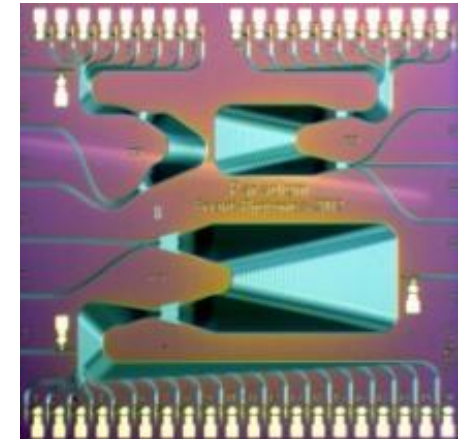
Fibre Bragg Grating (FBG)

- Totally Passive | Small Size & Weight
- Chemically Inert | Intrinsically Safe
- Non-conductive Immune to EMI
- Low Loss | Remote Sensing



Photonic Integrated Circuit (PIC)

- Small Size, Reduced Weight
- Improved Thermal and Vibration Stability
- Hybrid Integration of Optics and Electronics
- Improved Reliability | Low Power | Lower Costs



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Integrated Photonics Sensing

hyperthermia | surgical interventions
high repeatability | multichannel absolute
FBG interrogator
internal reference | 0.1°C accuracy

MRI Compatible In-Vivo



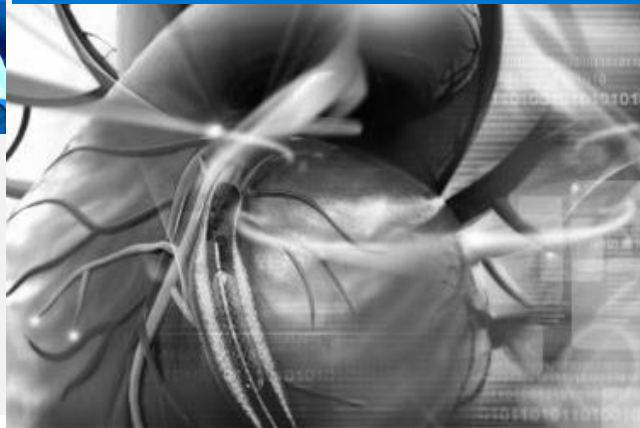
Minimal Invasive/Haptic Feedback



worlds first haptic feedback grasper |
minimal invasive surgical interventions |
OEM modular FBG interrogator
tissue force feedback system | hart beat
feeling experience

angioplasty treatments
microstructure optical fiber for pressure
sensing
combined shape, temperature, pressure
sensing

Multi-Point/Parameter Sensing



Cardiac Interventions



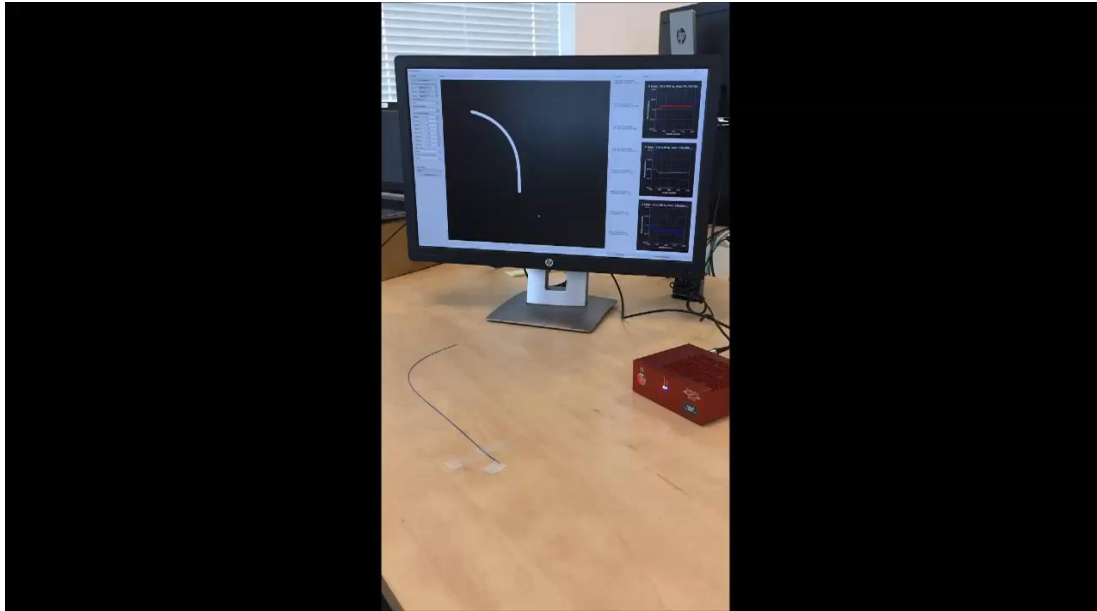
cardiac diagnostics | multicore optical fiber
for shape sensing | guidewires |
catheter systems
integrated force tip sensing

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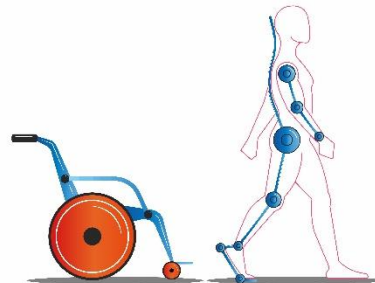


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Shape reconstruction

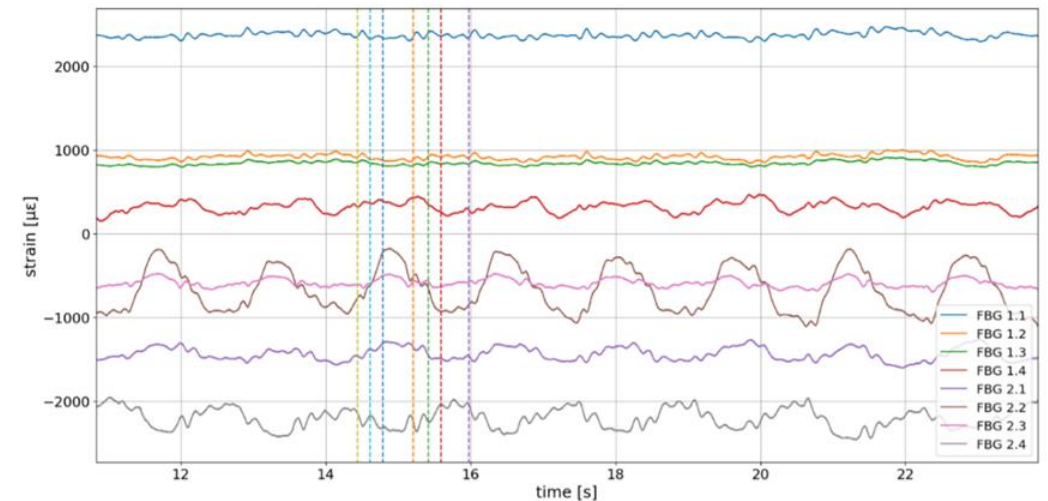
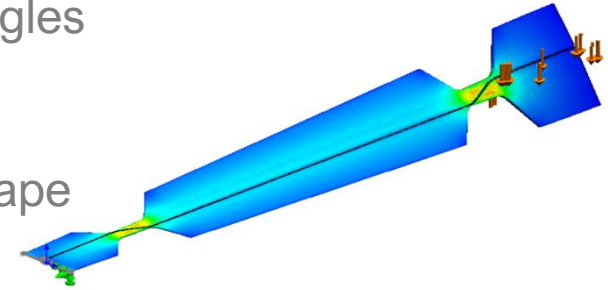


Relevant Examples:
Helping people to walk again



SHAPE RECONSTRUCTION

- Integrate fiber with bending axis offset
- Apply beam on any surface
- Measure real-time angles and strain
- Used for real-time shape monitoring
- Principle works in all sizes



Measurement signals during gait cycle

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Integrated Photonics Sensing

Haptic Feedback (also called kinaesthetic communication or 3D touch) using Fiber Optic Sensing and Integrated Photonics

Reduce lesion damage from too much force

Offers visco-elastic tissue feeling

Ergonomic pistol hand grip

Training: Much shorter learning curve



Packaged ASPIC 'OptiGator'



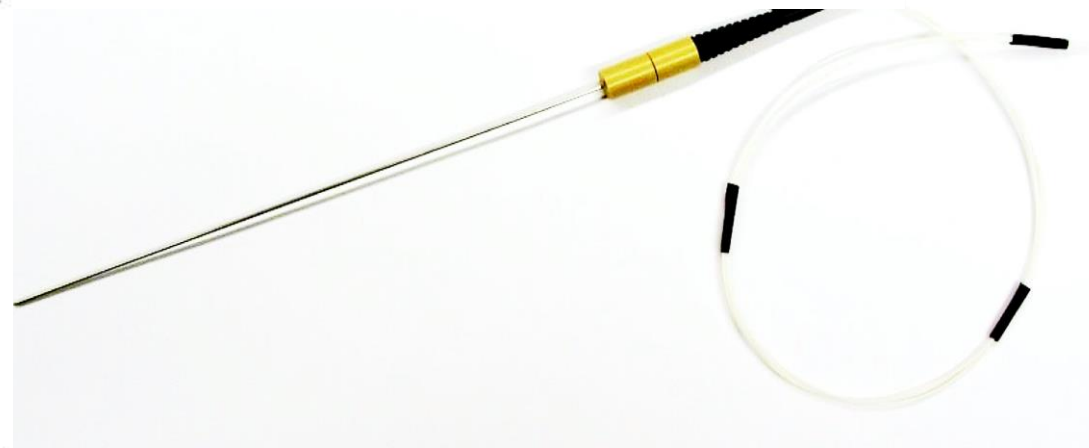
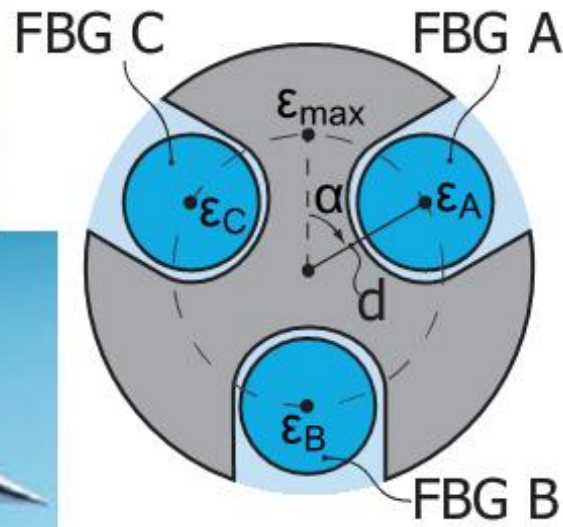
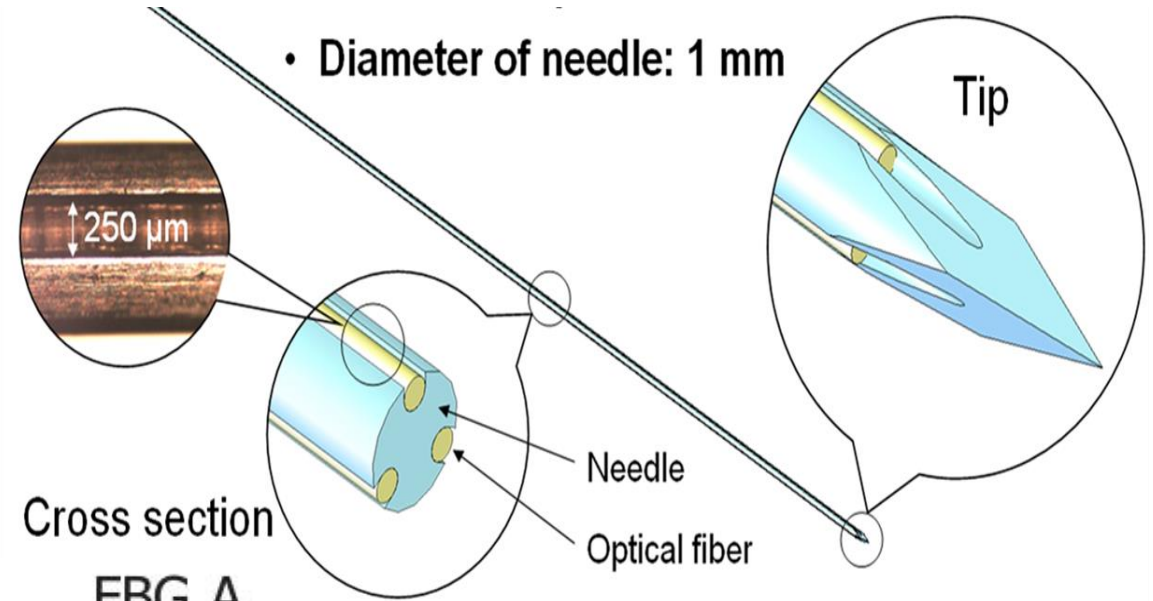
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Integrated Photonics Sensing

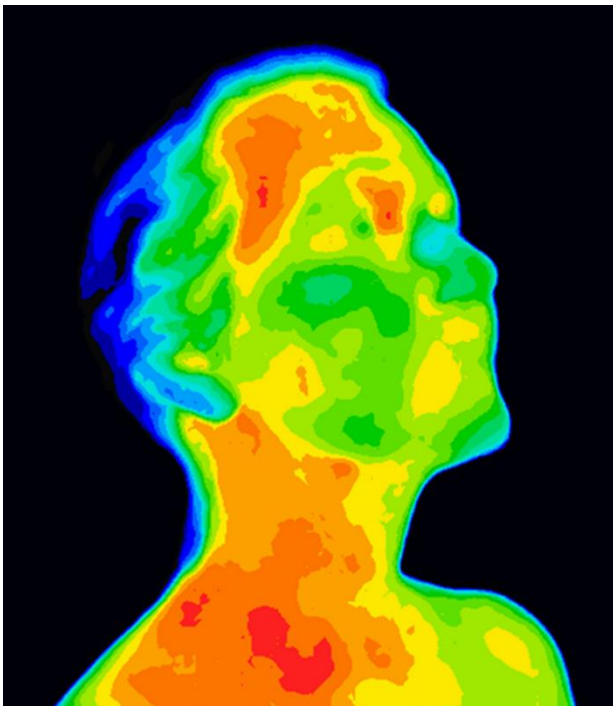
Minimally Invasive Biopsy Needle

Steerable MRI compatible robotic instruments with precise force sensing for accurate tissue characterization and dexterous navigation in percutaneous interventions



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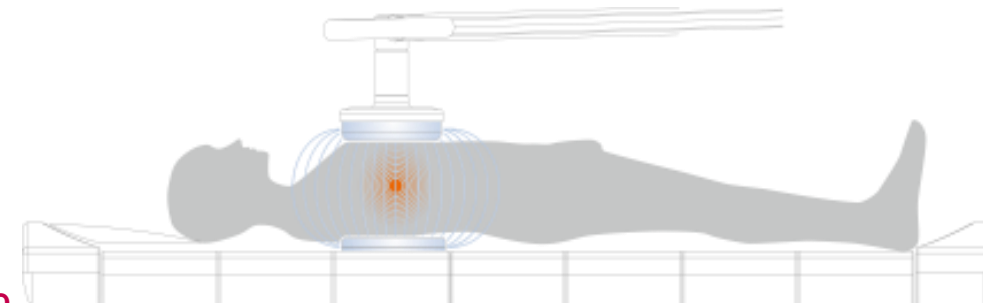


RF/MRI compatible in-vivo temperature sensing

The T-gator is an absolute temperature sensing system using fiber optic sensors. It can interrogate up to 7 optical fibers

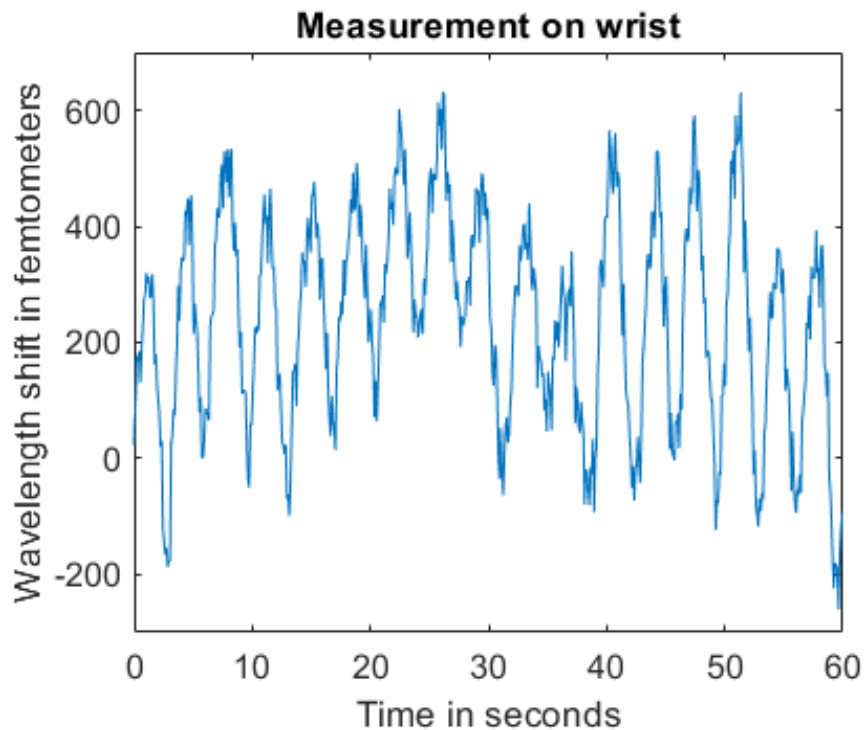
Especially during Hyperthermia and surgical interventions, accurate monitoring of in-vivo body temperature needs continuous monitoring

The T-Gator is considered a highly accurate absolute temperature sensing device applicable within an RF-environment. The precision (standard deviation) of the T-Gator is 0.03 °C over a period of 4 hours



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Application examples



Accidental discovery of respiratory function
during high accuracy measurements

PHYSIOLOGICAL IDENTIFICATION

- High accuracy strain measurement applied on human body
- Identifying respiratory and cardiac function
- Real-time patient monitoring

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Sensors for catheters



Interrogators



USB Thumb drive sized interrogator

Cigarette-Pack-sized interrogator includes battery pack+ Bluetooth

Fibre sensing



Physicians: Partnering with Technobis


What can EPIC members do for us and what can we do for you?

If you're a physician:
Knowledge of which parameters
would help you to perform
better?



Conclusions
Stefano Regusci SIPC


- Offer flexible Dx/ttt Prostatic cancer
- Personalized approach
- Help in planning ttt/energy, software...
- Help in monitoring ttt

EPIC Online Technology Meeting on Medical Lasers 

Focal laser Ablation Localized Prostate Cancer
Stefano Regusci Martina Martins Favre



URORAD
CONCEPT

EPIC Online Technology Meeting on Medical Lasers 


EPIC
European Photonics
Industry Consortium

Tuesday, 2 June 2020, 15:00 CEST
EPIC Online Technology Meeting on Medical Lasers

Let's talk further. Contact me: anna.nikiel@technobis.com



Medical Device Manufacturers: Partnering with Technobis

What can EPIC members do for us and what can we do for you?

How can we integrate our data-gathering sensors
into your optical medical devices
to make new outstanding products for a reasonable price?



Let's talk further. Contact me: anna.nikiel@technobis.com

