

Light Sources for Optical Coherence Tomography

19-March-2014 Dr. Christian Vélez, Founder and CEO

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Outline

- Products
- Markets
- Applications
- Optical Coherence Tomography
 - Superluminescent LED (SLED) solutions
 - Swept Source (fast tunable Laser) solutions
- Summary



EXALOS

- HQ in Schlieren/Zürich
- Employees: 30
- Revenue: ~CHF 10m
- Profitable
- Shipped >200k devices since 2003

, EXALOS

Focused on engineering, sales and marketing of

11111C

- Superluminescent Diodes (EXS)
- Broadband Sources (EBS)
- Wavelength-Swept Lasers (ESS)
- SLED-based Transceivers (TxRx)
- Balanced Receivers (EBR)



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Speckle performace comparison SLED/LD



Blue LDs strong speckles

SLED light at 425nm with strongly reduced speckle pattern



EXALOS' SLED modules

SLED Modules

Solutions for ultra-high output power and ultra-wide bandwidth

- High-power ultra-broadband SLEDs
- Wavelengths from 650 to 1700 nm
- Cooled packages for fiber-based or free-space applications
- Uncooled low-cost packages

www.exalos.com



Power Density [dBm/0.1nm]

EXALOS Long Wavelength SLEDs

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-10





InP

EXALOS Main Markets







Optical Coherence Tomography (OCT)



Time-Domain (TD-) OCT





Penetration vs Resolution

	OCT Ultrasound		MRI FI	uoroscopy	Angioscopy
	No.			K	Normal Pigmented Non-pigmente
Resolution (µm)	1–15	80–120	80–300	100-200	<200
Probe Size (µm)	140	700	N/A	N/A	800
lonizing Radiation	No	No	No	Yes	No



OCT for Ophthalmology



OCT and Histology



E. Anger, W. Drexler et al. Exp Eye Res 78, 1117 (2004)

- Goal of any imaging technology = visualization of structures that are found with histology !
- Fast spectral-domain OCT systems (and in combination with higher resolution of few microns) have demonstrated that OCT in ophthalmology is equally informative as histology but is non-invasive, real time and in-vivo !



Medical OCT Imaging





E. Swanson: "Photonics Markets: OCT – History and Current Status", Feb 2013

Non-Medical OCT Imaging



OCT Evolution



Spectral-Domain (SD-) OCT







Swept Source (SS-) OCT









Swept Sources for OCT



SLED vs Swept Source



A high-speed narrowband optical filter with wide tuning range is needed



EXALOS: ECL with MEMS Scanner





Summary

- Optical Coherence Tomography has become a key technology for medical imaging
- A must for Ophthalmic and Cardio applications
- Light sources are a key enabler of today OCT systems
- Incumbent SLED technology is more and more been replaced by Swept Laser
- EXALOS has mange to position itself as a key player in this market





Thank You

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