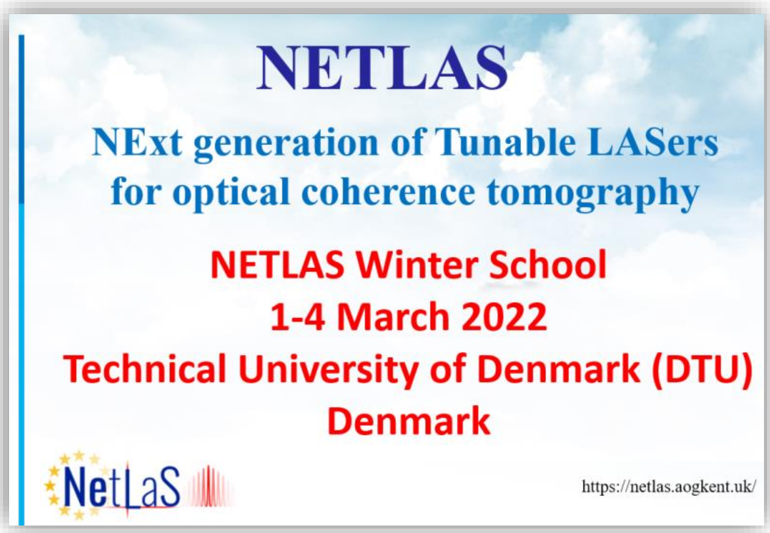
NETLAS NEWSLETTER 1-2022

First newsletter of the 2022

Wishing you a very good 2022 Year!

NETLAS Winter School



NETLAS Winter school is scheduled to take place at Technical University of Denmark (DTU), Denmark, between 1 and 4th March 2022. Organizers are preparing the event to be attended in person, however online participation is possible for those who do not feel safe to travel.

Winter school program is under construction; initial plan is that all PhD students will present their work. The ESRs who spent more than one year in NETLAS should all present an oral presentation, while those for less than a year, to present a poster. There will be presentations delivered by invited speakers to cover general skills: scientific writing, responsible conduct and oral communications. More details will follow soon.

CONFERENCES

Optometry Conference SERIES
Optical Coherence Tomography

Related Conference of Optical Coherence Tomography

February 18-19, 2022 **32nd World Congress on Ophthalmology and Optometry** ROME, ITALY	March 07-08, 2022 **7th Global Pediatric Ophthalmology Congress** BARCELONA, SPAIN	March 14-15, 2022 **17th International Conference on Ophthalmology and Vision Science** ZURICH, SWITZERLAND
March 21-22, 2022 **22nd Global Ophthalmologists Annual meeting** AMSTERDAM, NETHERLANDS	March 28-29, 2022 **7th International Conference & Expo on Euro Optometry and Vision Science** BERLIN, GERMANY	April 11-12, 2022 **2nd International Conference on Ophthalmology** PRAGUE, CZECH REPUBLIC
April 21-22, 2022 **5th International Conference on Ear Nose and Throat** AMSTERDAM, NETHERLANDS	April 26-27, 2022 **European Conference on Ophthalmology & Eye care** AUCKLAND, NEWZEALAND	April 27-28, 2022 **6th World Congress on Ophthalmology and Vision Science** TORONTO, CANADA
April 28-29, 2022 **3rd International Conference on Optometry** AMSTERDAM, NETHERLANDS	April 28-29, 2022 **5th World Eye and Vision Congress** AMSTERDAM, NETHERLANDS	May 04-05, 2022 **9th Global Ophthalmology Meeting** PRAGUE, CZECH REPUBLIC
June 13-14, 2022 **21st Asia Pacific Ophthalmologists Annual Meeting** BRISBANE, AUSTRALIA	June 15-16, 2022 **31st International Conference on Insights in Ophthalmology** MADRID, SPAIN	August 01-02, 2022 **World Congress on Ophthalmology and Optometry** ROME, ALAND ISLANDS
August 11-12, 2022 **5th International Conference on Eye and Vision** BERLIN, GERMANY	September 26-27, 2022 **32nd International Congress on Vision Science and Eye** ROME, ITALY	October 03-04, 2022 **3rd World Congress on Ophthalmology & Optometry** LONDON, UK
October 10-11, 2022 **36th European Ophthalmology Congress** VIENNA, AUSTRIA	October 11-12, 2022 **6th World Congress on Eye and Vision** OSAKA, JAPAN	October 11-12, 2022 **3rd International Conference on Glaucoma** OSAKA, JAPAN

NETLAS PhD Students recommendations to their peers

Rene Riha from Kent University Recommends:

The World's First Optical Oscilloscope – Game-Changing Innovation for Communication Technologies

A team from UCF (University Of Central Florida) has developed the world's first optical oscilloscope, an instrument that is able to measure the electric field of light. The device converts light oscillations into electrical signals, much like hospital monitors convert a patient's heartbeat into electrical oscillation.

Until now, reading the electric field of light has been a challenge because of the high speeds at which light waves oscillates. The most advanced techniques, which power our phone and internet communications, can currently clock electric fields at up to gigahertz frequencies — covering the radio frequency and microwave regions of the electromagnetic spectrum. Light waves oscillate at much higher rates, allowing a higher density of information to be transmitted. However, the current tools for measuring light fields could resolve only an average signal associated with a 'pulse' of light, and not the peaks and valleys within the pulse. Measuring those peaks and valleys within a single pulse is important because it is in that space that information can be packed and delivered.

The team's findings are published in Nature Photonics journal. Reference: "**Single-shot measurement of few-cycle optical waveforms on a chip**" by Yangyang Liu, John E. Beetar, Jonathan Nesper, Shima Gholam-Mirzaei and Michael Chini, 13 December 2021, *Nature Photonics*.
DOI: 10.1038/s41566-021-00924-6

Haris Ashraf from DTU Recommends:

Tailoring Lasers for Specific Swept Source OCT Applications

The Optica Student Chapter Meeting at the University of Kent

December is Annual Report time for Optica (formerly OSA) Student Chapters. The goal of the annual report is to look back on a year of activities and start planning the year ahead, as well as making sure everything is up and running on the admin side. On Wednesday 8th December, student members at Kent had a meeting to complete their own annual report and reflect on 2021 activities and future plans.

The highlight of last year was undoubtedly the OPSP conference, run online for pandemic-related reasons, nevertheless a real satisfaction for all the organising team with more than 100 attendees, ~30 presenting PhD students and ~10 invited speakers/workshop leaders for two days of talks, workshops and poster sessions!

New Year 2022 started with a calendar project, dubbed the *Abnormal Applied Optics Group calendar*, as delays in designing and printing had February 2022 figuring on the first page! Please contact Alejandro (a.martinez-jimenez@kent.ac.uk) if you fancy one! Plans also include the election of a new committee, the recruitment of new members and hopefully the organisation of an optics outreach workshop in a nearby school.

The Optical Society is now called Optica, in an effort to have a more universal impact! NETLAS PhD Students Sacha Grelet (on the laptop screen) and Alejandro Martinez (right), together with AOG PhD Students Adrian Fernandez Uceda (middle) and Julien Camard (behind the camera) celebrate the delivery of the brand new Chapter flag!

PUBLICATIONS

Phase-sensitive optical coherence elastography with a 3.2 MHz FDML-laser using focused air-puff tissue indentation

Katharina Rewerts, Moritz Matthiae, Nicolas Detrez,
Steffen Buschschlüter, Matteo Mario Bonsanto, **Robert Huber,**
Ralf Brinkmann

Proceedings Volume 11919, Translational Biophotonics: Diagnostics and Therapeutics; 1191918 (2021)
https://doi.org/10.1117/12.2614833
Event: European Conferences on Biomedical Optics, 2021, Online Only

Abstract
Tumor discrimination from healthy tissue is often performed by haptically probing tissue elasticity. We demonstrate non-contact elastography using air-puff excitation and tissue indentation measurement by phase-sensitive OCT with a 3.2 MHz FDML-laser.

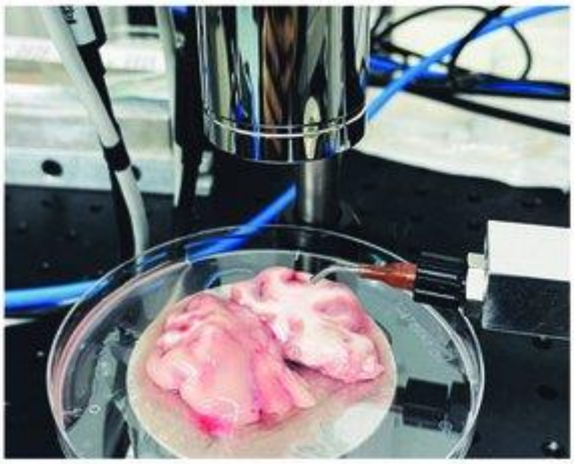


Fig1: OCT measurement of porcine brain tissue excited by the air-puff (dispensing needle on the right side of the picture) without contact. The objective of the OCT is located above the sample.

Spectroscopic analysis through thermoelastic optical coherence microscopy

Aaron Doug Deen, Tom Pfeiffer, Heleen van Beusekom,
Jeroen Essers, Antonius F. W. van der Steen, **Robert Huber,** Gijs van Soest,
Tianshi Wang

Proceedings Volume 11924, Optical Coherence Imaging Techniques and Imaging in Scattering Media IV; 119240Y (2021)
https://doi.org/10.1117/12.2616068
Event: European Conferences on Biomedical Optics, 2021, Online Only

Abstract
We exploit the thermoelastic effect to acquire spectroscopic information which is based on the inherent tissue optical absorption properties. We support the acquired data with a 2D model along with system characterisation.

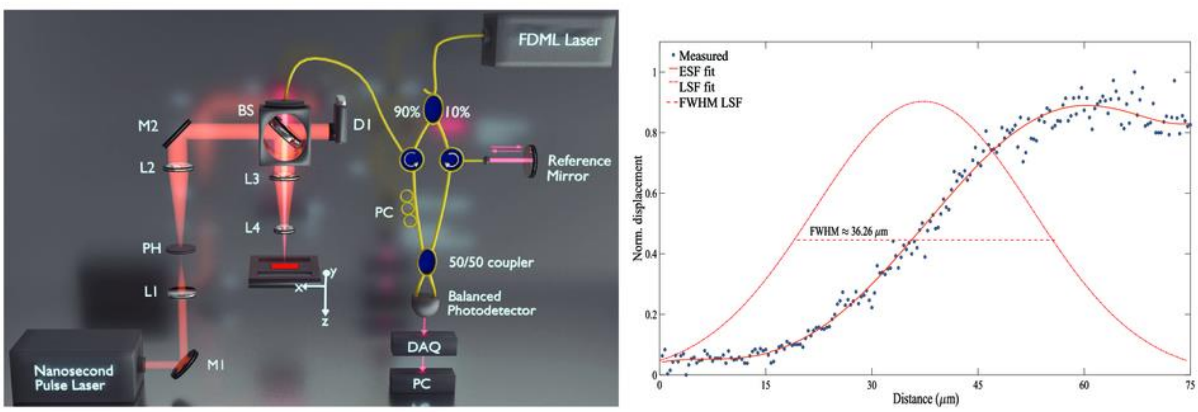


Fig.1: Thermoelastic Optical Coherence Microscopic setup and Edge Spread Function measurement. A schematic of the microscopic system is seen on the left. The right plot depicts the lateral resolution of the system extracted from the measured ESF. M1-M2: mirror, L1-L4: lens, PH: pinhole, BS: beamsplitter, D1: photodetector, FDML: Fourier domain mode locked, PC: polarisation controller, DAQ: Data acquisition card.

Towards densely sampled ultra-large area multi-MHz-OCT for in-vivo skin measurements beyond 1 cm²/sec

Madita Göb, Sazgar Burhan, Wolfgang Draxinger, Jan Philip Kolb,
Robert Huber

Proceedings Volume 11924, Optical Coherence Imaging Techniques and Imaging in Scattering Media IV; 119240P (2021)
https://doi.org/10.1117/12.2616054
Event: European Conferences on Biomedical Optics, 2021, Online Only

Abstract
We demonstrate a 3.3 MHz A-scan rate OCT for rapid scanning of large areas of human skin. The mosaicking performance and different OCT imaging modalities including intervolume speckle contrast are evaluated.

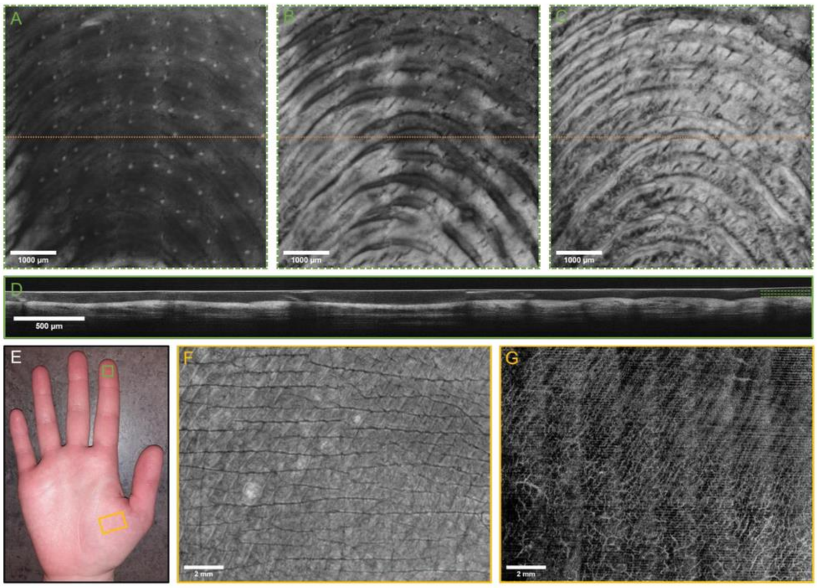


Fig.3: High-resolution and vascular contrast mosaicking MHz OCT images of a palm. (a-d) 5x5 stitched highresolution OCT images of the fingertip. (a-c) Enface projections at different depths indicated by the green dashed lines in the B-scan view (d). (f-g) OCT of the thenar consisting of 8x6 volumes. (f) stitched intensity-based enface projections and (g) the corresponding stitched vascular contrast mode OCT image of the same dataset. (e) Photograph of the palm.

Enablers and Barriers to Deployment of Smartphone-Based Home Vision Monitoring in Clinical Practice Settings

Edward Korot, MD; Nikolas Pontikos, PhD; Faye M. Drawnel, PhD; Aljazy Jaber, BA; Dun Jack Fu, MD; Gongyu Zhang, MSc; Marco A. Miranda, PhD; Bart Liefers, PhD; Sophie Glinton, PhD; Siegfried K. Wagner, MD; Robbert Struyven, PhD; Caroline Kilduff, MD; Darius M. Moshfeghi, MD; **Pearse A. Keane,** MD; Dawn A. Sim, PhD; Peter B. M. Thomas, PhD; Konstantinos Balaskas, MD

Published Online: December 16, 2021

JAMA Ophthalmol. doi:10.1001/jamaophthalmol.2021.5269

IMPORTANCE: Telemedicine is accelerating the remote detection and monitoring of medical conditions, such as vision-threatening diseases. Meaningful deployment of smartphone apps for home vision monitoring should consider the barriers to patient uptake and engagement and address issues around digital exclusion in vulnerable patient populations.

OBJECTIVE: To quantify the associations between patient characteristics and clinical measures with vision monitoring app uptake and engagement.

DESIGN, SETTING, AND PARTICIPANTS: In this cohort and survey study, consecutive adult patients attending Moorfields Eye Hospital receiving intravitreal injections for retinal disease between May 2020 and February 2021 were included.

CONCLUSIONS AND RELEVANCE: This evaluation of home vision monitoring for patients with common vision-threatening disease within a clinical practice setting revealed demographic, clinical, and patient-related factors associated with patient uptake and engagement. These insights inform targeted interventions to address risks of digital exclusion with smartphone-based medical devices

80 MHz swept source operating at 1060 nm based on all-normal-dispersion supercontinuum generation for ultrahigh-speed optical coherence tomography

Sacha Grelet, Patrick Bowen, Peter M. Moselund, **Adrian Podoleanu**

Proceedings Volume 11924, Optical Coherence Imaging Techniques and Imaging in Scattering Media IV; 119240C (2021)
https://doi.org/10.1117/12.2616019
Event: European Conferences on Biomedical Optics, 2021, Online Only

Abstract: We present an akinetic swept-source based on all-normal-dispersion supercontinuum generation using a low-noise femtosecond laser. Its 80-MHz repetition-rate and 55-nm bandwidth centered at 1060-nm are suitable for fast optical coherence tomography.

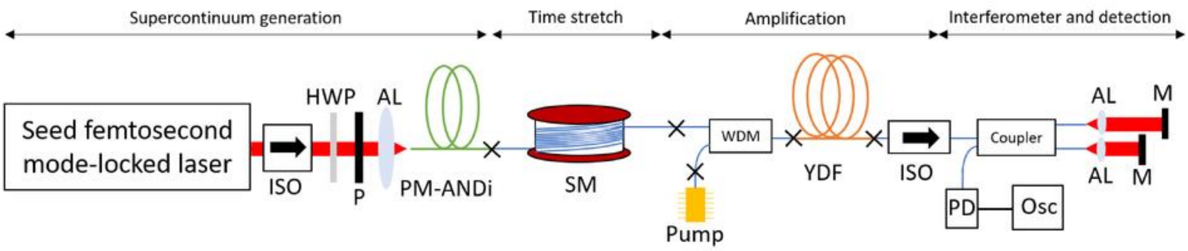


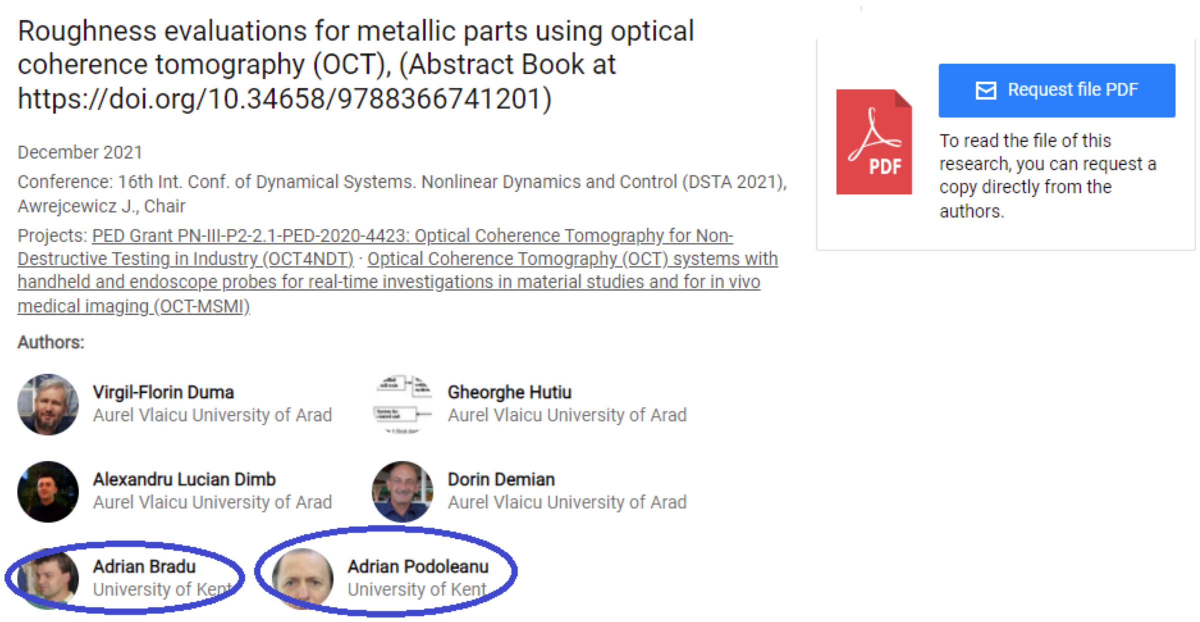
Fig.1: Schematic diagram of the experimental set-up, using a seed femtosecond mode-locked laser, isolators (ISO), half wave plate (HWP), polarizer (P), aspheric lenses (AL), polarization maintaining all-normal dispersion fiber (PM-ANDI), single mode fiber stretcher (SM), wavelength division multiplexer (WDM), ytterbium dopped fiber (YDF), pump diode, fiber coupler, silver mirrors (M), high-speed photodetector (PD) and Picoscope.

Roughness evaluations for metallic parts using optical coherence tomography (OCT)

Virgil-Florin Duma, Gheorghe Hutiu, Alexandru Lucian Dimb, Dorin Demian, **Adrian Bradu, Adrian Podoleanu**

December 2021
Conference: 16th Int. Conf. of Dynamical Systems. Nonlinear Dynamics and Control (DSTA 2021), Awrejcewicz J., Chair
Projects: PED Grant PN-III-P2-2.1-PED-2020-4423: Optical Coherence Tomography for Non-Destructive Testing in Industry (OCT4NDT)
Optical Coherence Tomography (OCT) systems with handheld and endoscope probes for real-time investigations in material studies and for in vivo medical imaging (OCT-MSMI)

Abstract Book at https://doi.org/10.34658/9788366741201)



Roughness evaluations for metallic parts using optical coherence tomography (OCT), (Abstract Book at https://doi.org/10.34658/9788366741201)

December 2021

Conference: 16th Int. Conf. of Dynamical Systems. Nonlinear Dynamics and Control (DSTA 2021), Awrejcewicz J., Chair

Projects: PED Grant PN-III-P2-2.1-PED-2020-4423: Optical Coherence Tomography for Non-Destructive Testing in Industry (OCT4NDT) · Optical Coherence Tomography (OCT) systems with handheld and endoscope probes for real-time investigations in material studies and for in vivo medical imaging (OCT-MSMI)

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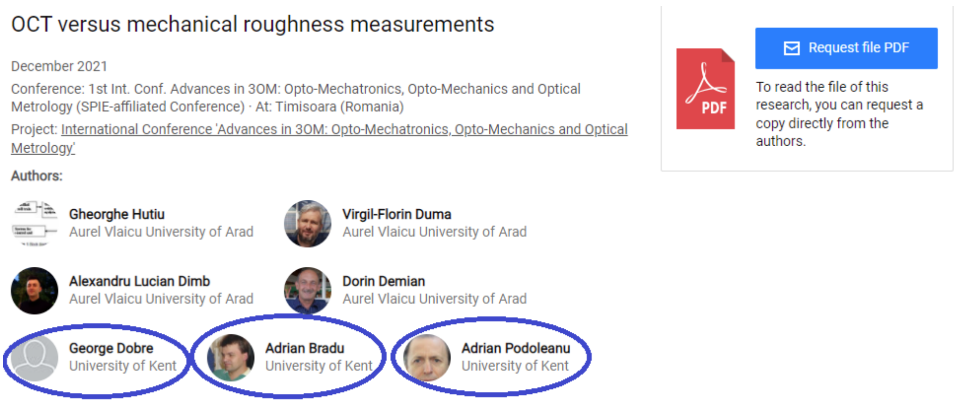
Request file PDF

To read the file of this research, you can request a copy directly from the authors.

OCT versus mechanical roughness measurements

Gheorghe Hutiu, Virgil-Florin Duma, Alexandru Lucian Dimb,
Dorin Demian, **George Dobre, Adrian Bradu, Adrian Podoleanu**

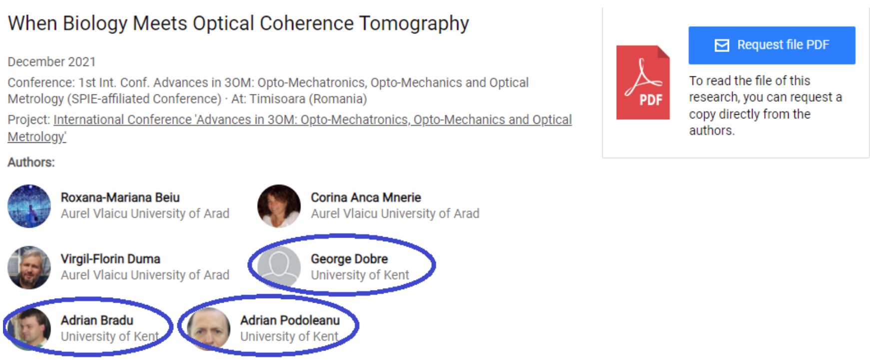
December 2021
Conference: 1st Int. Conf. Advances in 3OM: Opto-Mechatronics, Opto-Mechanics and Optical Metrology (SPIE-affiliated Conference)
Project: International Conference 'Advances in 3OM: Opto-Mechatronics, Opto-Mechanics and Optical Metrology'



When Biology Meets Optical Coherence Tomography

Roxana-Mariana Beiu, Corina Mnerie, Virgil-Florin Duma, **George Dobre,
Adrian Bradu, Adrian Podoleanu**

December 2021
Conference: 1st Int. Conf. Advances in 3OM: Opto-Mechatronics, Opto-Mechanics and Optical Metrology (SPIE-affiliated Conference)
Project: International Conference 'Advances in 3OM: Opto-Mechatronics, Opto-Mechanics and Optical Metrology'



Endoscopic en-face optical coherence tomography and fluorescence imaging using correlation-based probe tracking

Manuel J. Marques, Michael R. Hughes, Adrián F. Uceda, Grigory Gelikonov, **Adrian Bradu,** and **Adrian Podoleanu**

Biomedical Optics Express Vol. 13, Issue 2, pp. 761-776 (2022)

https://doi.org/10.1364/BOE.444170

Forward-viewing endoscopic optical coherence tomography (OCT) provides 3D imaging *in vivo*, and can be combined with widefield fluorescence imaging by use of a double-clad fiber. However, it is technically challenging to build a high-performance miniaturized 2D scanning system with a large field-of-view. In this paper we demonstrate how a 1D scanning probe, which produces cross-sectional OCT images (B-scans) and 1D fluorescence T-scans, can be transformed into a 2D scanning probe by manual scanning along the second axis. OCT volumes are assembled from the B-scans using speckle decorrelation measurements to estimate the out-of-plane motion along the manual scan direction. Motion within the plane of the B-scans is corrected using image registration by normalized cross correlation. *En-face* OCT slices and fluorescence images, corrected for probe motion in 3D, can be displayed in real-time during the scan. For a B-scan frame rate of 250 Hz, and an OCT lateral resolution of approximately 20μm20µm, the approach can handle out-of-plane motion at speeds of up to 4 mm/s.

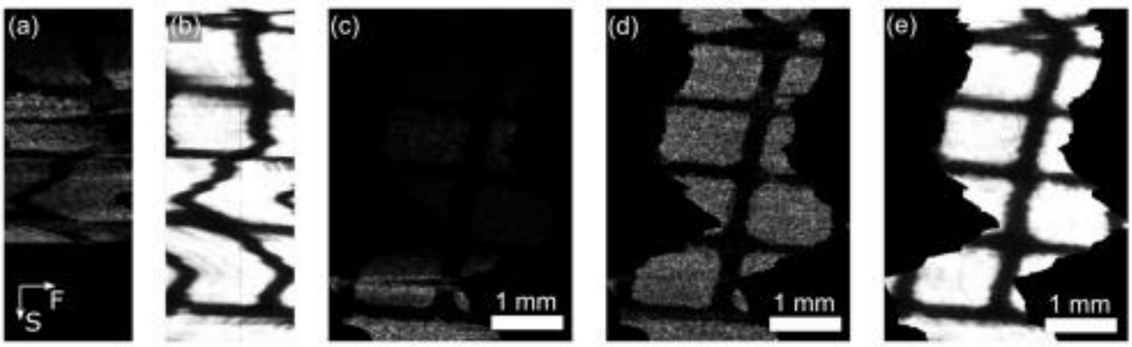


Fig. 4. Reconstruction of OCT and fluorescence images following freehand probe scan over fluorescently-stained printed grid phantom. (a) *En-face* slice extracted from raw volume. (b) Raw fluorescence image. (c) *En-face* slice from motion-corrected volume without surface correction. (d) *En-face* slice from motion-corrected volume with surface correction. (e) Motion-corrected fluorescence image. (a)-(b) have the same horizontal scale as (c)-(e) but have no vertical scale since this depends on the instantaneous probe speed. The arrows in (a) show the direction of the fast lateral (F) and slow manual endoscope (S) scans.

Bidirectional electrostatic MEMS tunable VCSELs

Arnhold Simonsen, Søren Engelberth Hansen, Masoud Payandeh, Andrey Marchevsky, Gyeong Cheol Park, Hitesh Kumar Sahoo, Elizaveta Semenova, Ole Hansen, **Kresten Yvind**

Published in: 2021 27th International Semiconductor Laser Conference (ISLC)
DOI: 10.1109/ISLC51662.2021.9615710

Abstract:
Bidirectional actuation using large voltages on the static electrodes allow linear tuning and reduction of AC voltage for stiff MEMS actuators. We use this to achieve 3.44% fractional bandwidth at 2.73 MHz, which results in a record-breaking one-way sweep-rate of fractional bandwidth (%) pr. µsec.

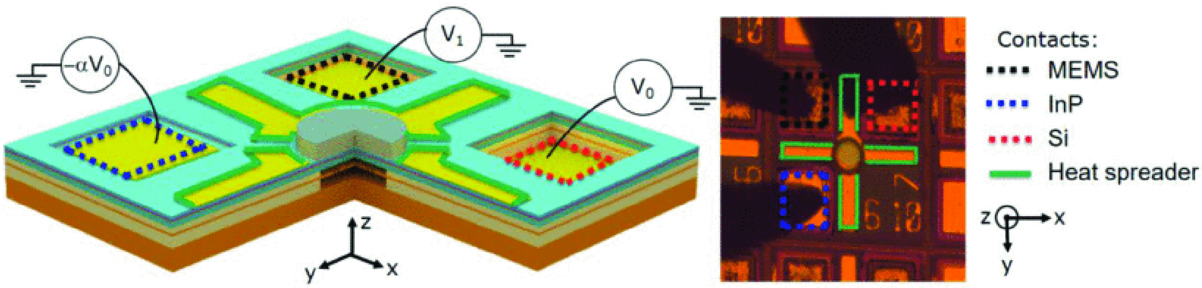
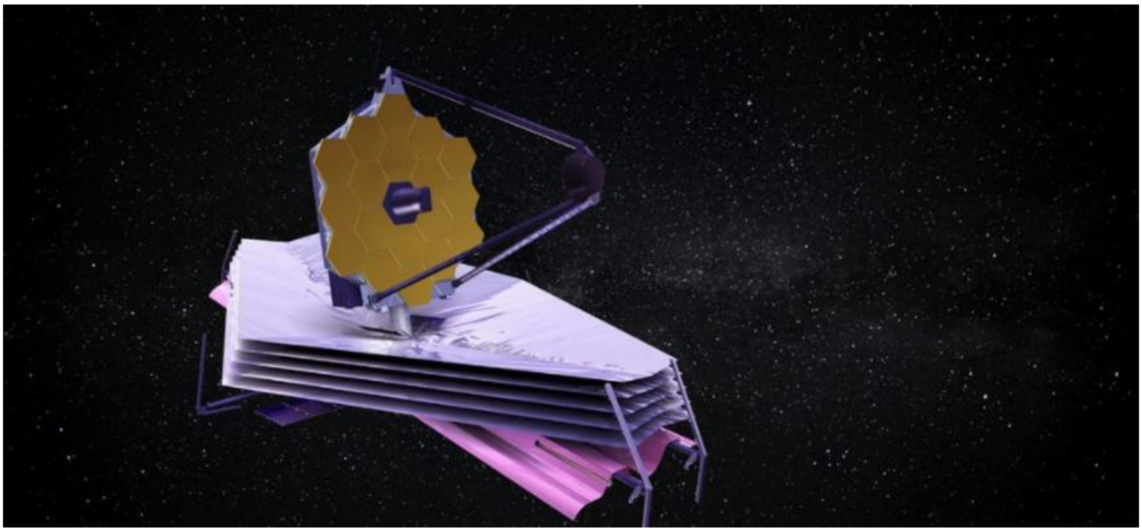


Fig. 1.
Left: Schematic side view. Right: Image top view



THE JAMES WEBB SPACE TELESCOPE LAUNCHED

Are you curious about the most powerful space telescope ever launched? We have gathered some information for you.

NASA, ESA, and CSA launched the James Webb Space Telescope on Dec. 25. Did you miss it? Watch the launch on YouTube.

This amazing telescope is 100 times more powerful than the Hubble space telescope.

The James Webb Space Telescope works as a time machine. It can detect light from the formation of galaxies that happened 13.5 billion years ago. And it will study the birth of the first stars, black holes, and galaxies.

Get more facts about the James Webb Space Telescope or read publications where our SuperK supercontinuum white-light lasers have helped the researchers.

Get more details

Webinars

We recommend our NETLAS PhD students to attend these upcoming webinars (part of the free Thorlabs webinar series). Thorlabs' Digital Webinars are covering a variety of topics, each with a dedicated live Q&A session, and have a common goal of providing educational, engaging, and valuable content. Their live webinars have concluded for 2021. Check back for next year's schedule and browse content from prior ones on the Recorded Webinars tab.

Thorlabs Previously Recorded Webinars

Thorlabs' Digital Webinar series began in mid-2020. Each webinar and Q&A session is recorded and added to the archive on Thorlab's web page.

NETWORK EVENTS

We invite all partners to communicate events and ideas to place in our newsletter

Please send any piece of news, on NETLAS activities or anything else happening that may be of interest to the NETLAS community, to Ramona Cernat: R.Cernat@kent.ac.uk and to Adrian Podoleanu: ap11@kent.ac.uk