European Optical Society — Coherence for Europe

EOS Conferences at the World of Photonics Congress 2013

13 - 15 May 2013, International Congress Centre Munich (ICM), Germany

ADVANCE PROGRAMME

EOSMOC 2013

3rd EOS Conference on Manufacturing of Optical Components

EOSOF 2013

2nd EOS Conference on Optofluidics

21st International Congress on Photonics in Europe
co-located with
LASER World of PHOTONICS 2013
Messe München GmbH
Messegelände, 81823 München (DE)
info@photonics-congress.com
www.photonics-congress.com

Sponsors:

AMERICAN ELEMENTS

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DOCTER® OPTICS

Cooperating Organisations:

optecnet Competence Networks for Optical Technologies

Media Partner:

Photonik

GENERAL INFORMATION

EOSMOC 2013

EOSMOC 2013 Schedule

Oral Presentations

EOSOF 2013

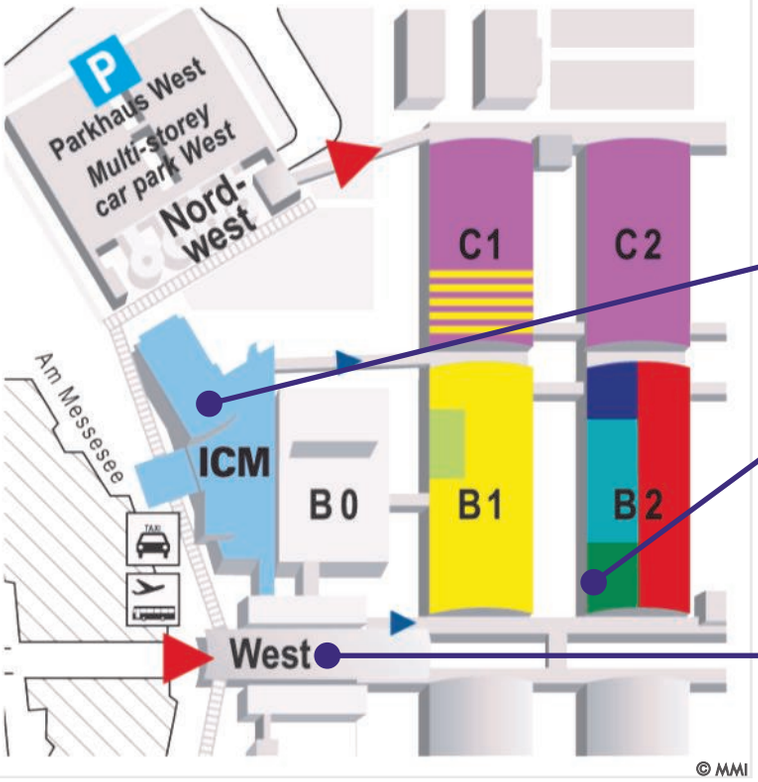
EOSOF 2013 Schedule

Oral Presentations

Contact: EOS - Events & Services GmbH · Renate Rebmann · Garbsener Landstraße 10 · 30419 Hannover, Germany
Phone: +49 (0)511 277-2676 · Fax: +49 (0)511 277-2699 · **munich@myeos.org** · **www.myeos.org/events/munich2013**

LOCATION OVERVIEW

HALL PLAN



CONFERENCE ROOM ALLOCATION:

EOSOF 2013:
Room 22, ICM, 2nd Floor

EOSMOC 2013:
Room B21, Exhibition Hall B2, 1st Floor

EOS REGISTRATION DESK:
Entrance hall West

LASER WORLD OF PHOTONICS EXHIBITION

The World of Photonics Congress is co-located with LASER World of PHOTONICS
13-16 May 2013 | New Munich Trade Fair Centre, Munich (DE)

THE WORLD'S LEADING TRADE FAIR IS TURNING 40 – DRIVING INNOVATION.

Industry marketplace, think tank, knowledge forum, source of momentum, solution provider, network – because it covers such a wide spectrum, LASER World of PHOTONICS has been inspiring the photonics market since 1973.

We look forward to seeing you at the 21st LASER World of PHOTONICS in Munich from May 13 – 16, 2013. With new momentum and, above all, exactly the customers that you hope to find there!

HALLS & CATEGORIES

Your registration for the EOS conferences includes free entrance to the exhibition area as well as admission to all conferences held at the World of Photonics Congress 2013!

OPENING HOURS OF THE EXHIBITION

- Monday, 13 May - Wednesday, 15 May: 09:00-17:00
- Thursday, 16 May: 09:00-16:00

VENUE & GETTING THERE

ICM - International Congress Centre Munich

Messe München GmbH
Am Messesee
81829 Munich
Germany

BY AIRPLANE

SPECIAL OFFER WITH LUFTHANSA -
discounted travel for international attendees
Lufthansa German Airlines offers a comprehensive global route network linking major cities around the world. Lufthansa offers special prices and conditions to participants, visitors, exhibitors and invited guests. The offer is valid between May 6 and May 23, 2013.
Detailed information about this special offer and the reservation process is available at the World of Photonics Congress website: http://world-of-photonics.net/link/en/26594989#26594989

BY BUS SHUTTLE
From the airport to the ICM:
There will be organised airport bus shuttles to the ICM/from the ICM to the airport (8.00 € one-way or 13.50 € round trip). Shuttle buses are provided from 8:00 to 18:00 and are running every 30 minutes. Travel time: approx. 45 minutes.

Stops at the airport:
Terminal 1, Area A: at 00 & at 30
Terminal 1, Area Z (central area): 4 minutes later, at 04 & 34
Terminal 2: four minutes earlier, at 56 & at 26
(Please note: There are no stops in Area D)

From the ICM ("West entrance") to the airport:
Shuttle buses are provided from 9:30 to 19:00 every 30 minutes.

WITH PUBLIC TRANSPORTATION
Please note that your registration **does not include** a ticket for public transport.

From the airport to the ICM:
Directly below the central area of the Munich Airport, you'll find the suburban train (S-Bahn) lines S1 and S8. Every 10 minutes a train departs for the city centre.
You can choose one of the following routes for your trip to the trade-fair centre:

Route S8/U5/U2 *- Travel time: approx. 46 minutes*
- Take the S8 to the stop "Ostbahnhof"
- Transfer to the U5 direction "Neuperlach Süd" and travel to the next station, "Innsbrucker Ring"
- From the same platform, transfer to the U2 direction "Messestadt Ost"
- Disembark at "Messestadt West" or "Messestadt Ost"

Route S8/U2 *- Travel time: approx. 60 minutes*
- Take the S8 to "Hauptbahnhof" (Munich Central Station)
- Transfer to the U2 direction "Messestadt Ost"
- Disembark at "Messestadt West" or "Messestadt Ost"

Route S1/U2 *- Travel time: approx. 60 minutes*
- Take the S1 to "Feldmoching" or "Hauptbahnhof" (Munich central station)
- Transfer to the U2 direction "Messestadt Ost"
- Disembark at "Messestadt West" or "Messestadt Ost"

From the airport to "Hauptbahnhof":
Route S1/S8 *- Travel time: approx. 45 minutes*
- Take the S1 direction "Ostbahnhof" or the S8 direction "Geltendorf" and get off at "Hauptbahnhof"
- For further information on getting from "Hauptbahnhof" to the ICM and useful links regarding public transport, please follow the recommendations under "By train/public transport" below

Tickets and prices | From the airport to the ICM:
- For a round trip: using a Single Day Ticket for entire network is recommended: 11.00 €
- For a single trip there are two alternatives:
  - Single ticket for 4 zones: 10.00 €
  - Stripe ticket (sold as a set of ten stripes for 12.50 €): from the aiport to "Messestadt West"or to Munich central station you have to validate 8 stripes (for 4 zones= 10 €)

Links:
- Getting there: http://world-of-photonics.net/en/photonics-congress/registration-travel/travel-accomodation/getting-there
- Munich Airport: www.munich-airport.de/en/consumer/index.jsp

BY TRAIN/PUBLIC TRANSPORT

If you travel to Munich by train, you may arrive at Munich central station ("Hauptbahnhof"). The journey from the central station to the New Munich Trade Fair Centre/ICM takes about 20 minutes by underground U2 (direction "Messestadt Ost"). Please get off at "Messestadt West".

Tickets and prices | From Munich central station to the ICM:
Your registration **does not include** a ticket for public transport.

- For a round trip: using a Single Day Ticket for inner district is recommended: 5.60 €
- For a single trip there are two alternatives:
  - Single ticket for 1 zone: 2.50 €
  - Stripe ticket (sold as a set of ten stripes for 12.50 €): from the central station to "Messestadt West" you have to validate 2 stripes (for 1 zones= 2.50 €)

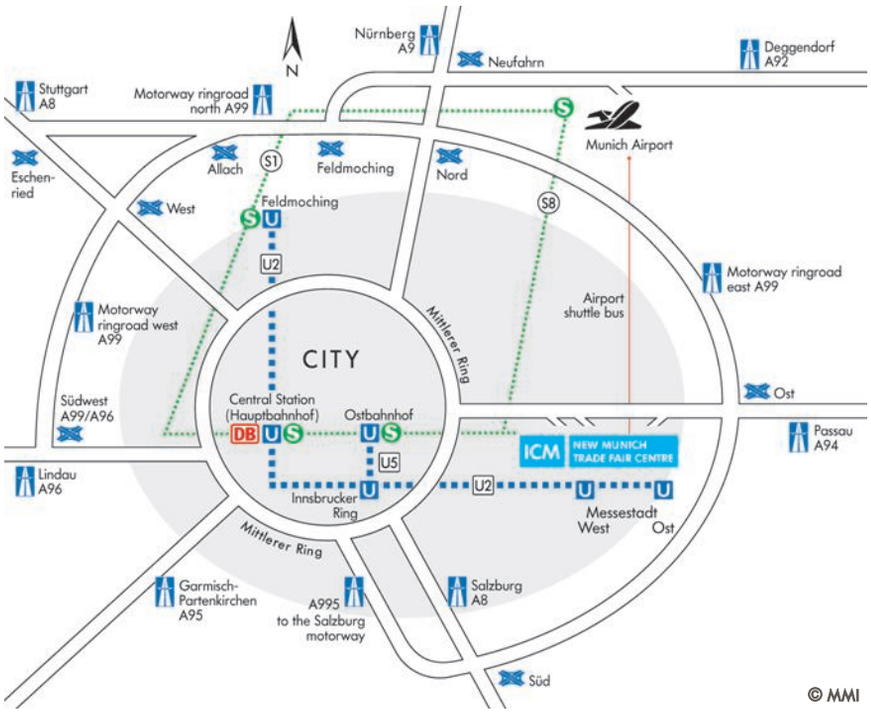
MVV tickets for any means of public transport can be obtaine from ticket machines (S- and U-Bahn stops), at ticket offices (Kiosks etc.), in regional busses. Single tickets and day tickets are also available at ticket machines in trams or busses.

Links:
- Journey planner: www.mvv-muenchen.de/en/journey-planner/index.html
- Ticket navigator: www.mvv-muenchen.de/en/tickets-fares/ticket-navigator/index.html
- Network maps: www.mvv-muenchen.de/en/network-stations/network-maps/index.html

VENUE & GETTING THERE (continued)

BY CAR

Due to Munich's good infrastructure, the ICM can easily be reached from all directions. The ICM is located directly on the A94 motorway, exits "Feldkirchen-West" (Exit No. 6) or "München-Riem" (Exit No. 5). Please follow the trade fair signs (Messe/ICM) which you will find throughout the city. A dynamic traffic-guidance system guides congress attendees to the nearest available parking area at the ICM.



Important information:
The city of Munich is a low emission zone, therefore high-emission vehicles are no longer allowed to drive in the city centre. A sticker will be required to prove that your vehicle fulfills the EU exhaust standards.

From October 2012, **only cars with a green sticker are allowed to drive into the city center**, defined as inside the "Mittlerer Ring". Cars with yellow and red stickers are forbidden in this area. Please note that the "Mittlere Ring" itself is not part of the low emission zone.

This also applies to anyone visiting the city. The regulation covers all automobiles, buses, motor homes and trucks.

Messe München GmbH and DEKRA Automobil GmbH have set up a service point for exhibitors and visitors. Emissions stickers may be purchased at DEKRA for EUR 5.00.

DEKRA Automobil GmbH

Munich East Service Point	Opening times:
Karl-Schmid-Str. 14	Mon-Wed, Fri: 7:30-18:00
81829 München (DE)	Thurs: 7:30-20:00
Tel. +49(0)89/42007-03	Sat: 8:00-12:00

Driving to the New Munich Trade Fair Centre/ICM with a navigation system

- The destination address to enter into your navigation system is "An der Point".
- Depending on which navigation system you use, the New Munich Trade Fair Centre and the ICM are listed under the categories "Exhibition Center", "Trade-fair Center" and under the German keyword "Messe".
- Some navigation systems allow you to specify a certain entrance to the trade-fair center. In this case, please select the West entrance, Am Messesee, 81829 München.

Links

- Getting there & route planner: http://world-of-photonics.net/en/photonics-congress/registration-travel/travel-accomodation/getting-there
- Munich's low emission zone: www.muenchen.de/rathaus/home_en/Environment-and-Health/Low_emission_zone
- Use the route planner on your smartphone:

ACCOMMODATION

The Munich International Trade Fair offers a Hotel Guide providing a large variety of accommodation possibilities. Whether near the Congress Center ICM or centrally located - you will find a comprehensive offer of accommodations in and around Munich meeting your personal needs.

The **Hotel Guide** as well as information on accommodation, culinary scene and leisure activities is available at:
http://world-of-photonics.net/en/photonics-congress/registration-travel/travel-accomodation/your-stay

Well-prized student accommodations:

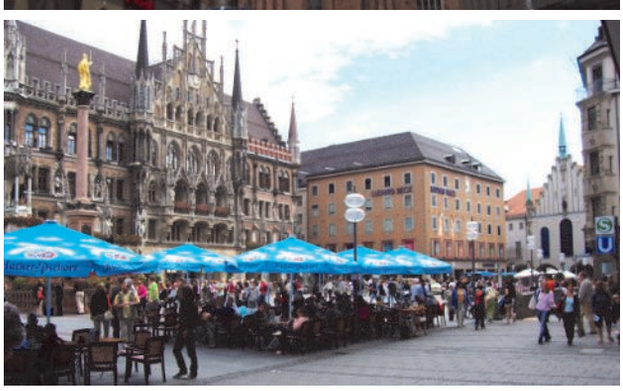
- House International: www.haus-international.de
- www.hostelworld.com/hostels/Munich

THE CITY: MUNICH

Besides the World of Photonics Congress, Munich has much to offer. The city does a perfect job of combining the professionalism of a commercial, media and research centre with culture and hospitality.

BAVARIAN RESTAURANTS IN THE CITY CENTRE:

- **Ratskeller** | www.ratskeller.com
  Opening times: daily 10:00- midnight
  Marienplatz 8, 80333 München
  (station: "Marienplatz" U3/U6, all S-Bahn lines)
- **Spatenhaus an der Oper** | www.kuffler-gastronomie.de/en/muenchen/spatenhaus/index.php
  Opening times: daily 9:30-00:30
  Residenzstr. 12, 80333 München
  (station: "Marienplatz" U3/U6, all S-Bahn lines; or Odeonsplatz U4/U5)
- **Der Pschorr** | www.der-pschorr.de
  Opening times: daily 10:00-23:00
  Viktualienmarkt 15, 80331 Munich
  (station: "Marienplatz" U3/U6, all S-Bahn lines)
- **Weisses Bräuhaus** | www.weisses-brauhaus.de
  Opening times: daily 8:00-01:00
  Tal 7, 80331 Munich
  (station: "Marienplatz" U3/U6, all S-Bahn lines)



FAMOUS SIGHTS IN THE CITY CENTRE TO BE WORTH VISITING ARE:

- Cathedral Church of our Lady - Frauenkirche
  (Frauenplatz 1, 80331 Munich; station: "Marienplatz"; U3/U6, all S-Bahn lines)
- Church of St. Peter - Alter Peter (has an old tower from which you will have a nice view over Munich; station: "Marienplatz" U3/U6, all S-Bahn lines)
- Viktualienmarkt (Munich's biggest and most popular open air market, Am Viktualienmarkt 6, 80331 Munich; station: "Marienplatz" U3/U6, all S-Bahn lines)
- English Garden (between Prinzregentenstreet and Freimann)

For more information on Munich's sights, please refer to Munich's Tourist Office:
www.muenchen.de/Rathaus/tourist_office/57799/index.html

GUIDED TOURS IN MUNICH ARE E.G. ORGANISED BY:

- Spurwechsel: www.spurwechsel-muenchen.de/en/site/index
- Stattreisen: www.stattreisen-muenchen.de
- Weis(s)er Stadtvogel: www.weisser-stadtvogel.de
- Radius Tours and Bikes: www.radiustours.com/index.php

For more information, please refer to the organisers website.

MUNICH'S BEERGARDENS

Especially in summer, Munich's beergardens are a must and really worth visiting:

- **Biergarten am Viktualienmarkt**
  Opening times: Mon-Sat 9:00-22:00, Sunday closed
  Viktualienmarkt 9, 80331 Munich
  (station: "Marienplatz" U3/U6 and all S-Bahn lines)
- **Biergarten am Chinesischen Turm** (in the English Garden)
  Opening times: daily 10:00-23:00
  Englischer Garten 3, 80538 Munich
  (station: "Gisela Straße" U3/U6 + bus 154, direction Bruno-Walter-Ring, exit "Chinesischer Turm")
- **Seehaus** (in the English Garden at Kleinhesseloher Lake)
  Opening times: daily 10:00-01:00
  Kleinhesselohe 3, 80892 Munich
  (station: "Münchner Freiheit" U3/U6 + 15 minutes walk through the English Garden or station "Dietlindenstraße" U3/U6 + bus 144, direction Giesing Bahnhof, exit "Osterwaldstraße")
- **Augustiner Biergarten**
  Opening times: daily 11:30- midnight
  Arnulfstraße 52, 80335 Munich-Neuhausen (S-Bahn stations "Hauptbahnhof" or "Hackerbrücke", all S-Bahn lines)
- **Taxis Garten**
  Opening times: daily 11:30- approx. 23:00
  Taxisstraße 12, 80637 Munich
  (station: "Gern" U1)

For further information on e.g. restaurants, sightseeing or city maps please go to the official website for the city of Munich:
www.muenchen.de/int/en/

INFORMATION FOR AUTHORS AND ATTENDEES

ORAL PRESENTATIONS

Presentations shall be uploaded prior to the conference; details about format will follow later. This can be done online or - in exceptional cases - on-site ("Speaker's check-in" - Hall B0). Authors will receive detailed information on the presentation upload (up-load link, log-in data, upload guide) **about four weeks before the conference**. All uploaded files will be destroyed after the conference. Authors are requested to come to the conference room well in advance of their presentation to check-in with the conference chair.

Time slots: Presenting authors are allotted 15 minutes (12 minutes presentation plus 3 minutes for discussion). Please plan your presentation accordingly to meet the 15 minute maximum.

File format: MS-PowerPoint, Video is supported

Technical equipment: All technical equipment (presentation computer, video projector, sound system, laser pointer) will be available on-site. **Personal laptop cannot be connected in the conference rooms.**

POSTER PRESENTATIONS

Required poster size: Details about format will follow later.

Set-up/dismanteling: Poster numbers will be displayed on the poster boards to show authors where to place their poster. Material for poster set-up (double sided tape and similar pads) will be provided by the organiser. Further details will follow later.

Poster authors are requested to be present at their posters during the official poster session. Please prepare and print your poster in advance to the conference. Poster set-up and removal is in the responsibility of the authors. Any posters left on the boards at the close of the poster session will be discarded.

WEB-DATABASE

The complete World of Photonics programme will soon be available online at www.photonics-congress.com. The database offers versatile search functions and supports the composition of your individualized congress schedule that you can transmit to your PDA. The database provides information about all lectures and posters of a specific topic as well as the information about exhibitors at the show related to your inquiry!

OFFICIAL CONGRESS OPENING

The official congress opening including a Plenary Talk by **Stefan Hell** (Department of NanoBiophotonics - Max-Planck-Gesellschaft, Germany) will be on Monday morning, 13 May 2013, from 09:30-10:45 (Room 1, Congress Centre). Please arrive well in advance to receive your badge and conference material at the EOS registration desk to avoid long waiting times.

WELCOME RECEPTION

The "Get together" trade fair and congress will be taking place on Monday. The venue will be announced well in advance.

INTERNET AREAS AND W-LAN LOUNGE

With your own laptop, you may use the free internet access on the ground floor as well as in the W-LAN-lounge on the 1st floor in the Foyer of the Congress Centre. When you enter the Congress Centre through the main entrance the W-LAN-Lounge is located on the left side of the Foyer and on the gallery.

EOS REGISTRATION DESK

On-site registration hours		**Information / Receipts / Confirmation of attendance / Cash payment**
Monday, 13 May	tba.	Attendees requiring a payment receipt or confirmation of attendance
Tuesday, 14 May	tba.	may obtain these documents on-site at the EOS registration desk.
Wednesday, 15 May	tba.	Attendees paying by cash are requested to have the **exact change** ready
Thursday, 16 May	tba.	**in Euro**.

REGISTRATION & FEES

At least one author of an accepted contribution is requested to register properly in advance to the conference. Speakers at "Manufacturing of Optical Components" and "Optofluidics" need to register with EOS.

Registration category	**Early-bird fee** (until 22 April)		**Late fee** (after 22 April)	
	incl. 19 % VAT	**excl. VAT***	**incl. 19 % VAT**	**excl. VAT***
Registration for members**	510.00 €	428.58 €	590.00 €	495.80 €
Registration for non-members	630.00 €	529.41 €	710.00 €	596.64 €
Registration for student members**	150.00 €	126.05 €	195.00 €	163.87 €
Conference digest not included; Copy of student ID required				
Registration for student non-members	190.00 €	159.67 €	230.00 €	193.28 €
Conference digest not included; Copy of student ID required				
Registration for one-day	230.00 €	193.28 €	290.00 €	243.70 €
Conference digest not included				

** Member of: EOS EPS SPIE OSA IEEE WLT German Competence Networks for Optical Technologies (OpTech-Net, Bayern Photonics, Hanse Photonik, OpTecBB, PhotonicNet, Photonics BW, OptoNet, Optence, PhotonAix)

* PLEASE NOTE: Registrations from companies and non-university research institutes registered in EU countries (except Germany) are exempted from VAT, **if VAT no. is given**.

EOS CONFERENCE DIGEST

The full-time registration fee (member/non-member) includes a CD-ROM (ISBN 978-3-9815022-7-5) containing the abstracts of all accepted and invited contributions of EOSOF 2013 and the EOSMOC 2013. **Please note that one-day and student registrations do not include the digest CD-ROM.** The digests may be purchased additionally.

	incl. 19 % VAT		**excl. VAT***
Member fee	65.00 €	|	54.62 €
Non-member fee	75.00 €	|	63.03 €
Student fee *(Copy of student ID required)*	30.00 €	|	25.21 €

The EOS **does not publish** conference proceedings with extensive papers. Authors who wish to publish in-depth papers are welcome to take advantage of the special publication offer for JEOS:RP (see the next paragraph). The publication offer for JEOS:RP is an option but no obligation.

JEOS:RP - SPECIAL PUBLICATION OFFER

Attendees of EOSMOC 2013 and EOSOF 2013 are welcome to submit a paper to the Journal of the European Optical Society - Rapid Publications (JEOS:RP). JEOS:RP is a peer-reviewed open-access journal which is listed with ISI Journal Citation Reports.
2011 Impact Factor: 1.019
The paper must be an original high-quality contribution connected to one conference and will be reviewed accordingly to the normal procedure of the journal. In case of acceptance authors will **receive a 20% discount on the publication rate**. The paper must be submitted no later than **30 June 2013** (www.jeos.org).

Special publication fee for standard papers of EOS attendees

- 280 € (instead of 350 €) for full EOS members
- 320 € (instead of 400 €) for non EOS members

For further information please see: www.jeos.org/forms/AuthorGuide.pdf

BEST STUDENT PRESENTATION AWARD

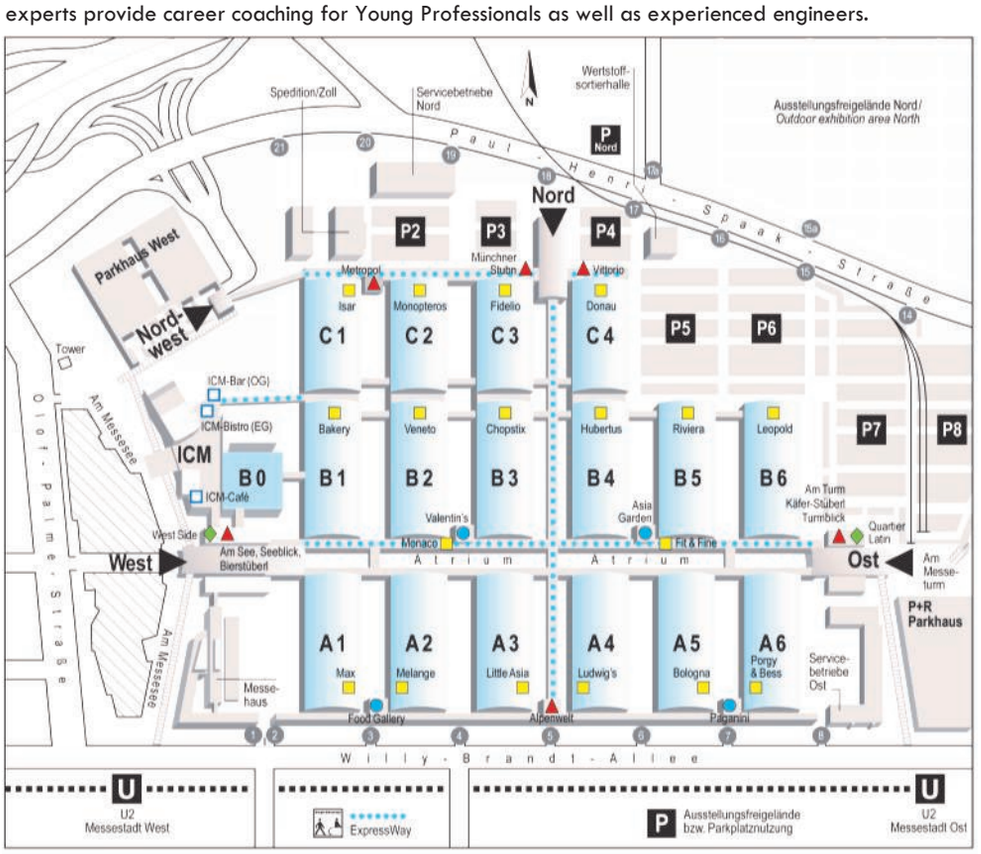
Sponsored by Springer science+business media

The best student oral and poster presentation of EOSMOC 2013 and EOSOF 2013 will be awarded a diploma, a book prize sponsored by Springer and an EOS student membership for 2013.
All student oral and poster contributions are eligible to the prize. The criteria for the award are relevance, originality, scientific merit and clarity.

Notification to the Awardees: The winners of the best student oral and poster award will be announced at the end of the last session of EOSMOC 2013 and EOSOF 2013.

CAREER CENTER AT LASER WORLD OF PHOTONICS 2013

LASER World of PHOTONICS organises again a Career Center in conjunction with its career partner beratungsgruppe wirth + partner. Exhibitors of LASER World of PHOTONICS have the possibility to publish their job advertisements on a jobboard in the Career Center where H&R experts provide career coaching for Young Professionals as well as experienced engineers.



Contact & further information:
Katrin Hirl | Messe München GmbH
Email: katrin.hirl@messe-muenchen.de
Phone: +49 (0)89 949 20325
Fax: +49 (0)89 949 97 20325
URL: http://world-of-photonics.net/en/laser/start/hidden/careercenter

CATERING

All conference participants may attend the free coffee breaks. Lunch is not included in the registration fee.
A great number of bars and restaurants is available at the fairground (please see overview plan on the left).

SYNOPSIS

Advancements in technology and innovative manufacturing processes are crucial for optical sector growth in today's global markets. Markets with high developmental momentum include the energy and semiconductor, life sciences, health care and the agri-food industries. Optical technologies play a crucial role in these markets, the importance of sophisticated but economically priced optical components being vital to new products and applications.

The 3rd EOS Conference on Manufacturing of Optical Components, EOSMOC 2013, will highlight significant technology trends, emerging technologies and associated prospective developments. This meeting provides a forum for all aspects of optics fabrication and testing, ranging from micro to large-scale optics and from high value one-off to mass-produced components.

Held in conjunction with the LASER World of PHOTONICS 2013 trade fair, one of the worlds largest for optics, it will be a unique opportunity for the exchange of information with renowned researchers, scientists, engineers and professionals from all over Europe!

SCIENTIFIC COMMITTEE

GENERAL CHAIR

Klaus-Friedrich Beckstette
Carl Zeiss AG Jena/Oberkochen (DE)

CO-CHAIR

Paul Comley
Cranfield University (GB)

Latest Advances in Freeform Optics

CHAIRS

Sven Kiontke
asphericon (DE)

Wilhelm Ulrich
Carl Zeiss AG (DE)

Precise Optics Fabrication

CHAIRS

Oliver Fähnle
FISBA Optik AG (CH)

Axel Schindler
Leibniz-Institute of Surface Modification - IOM (DE)

High-Volume Manufacturing, Micro-Optics and Structured Surfaces

CHAIRS

Stefan Bäumer
TNO (NL)

Andreas Fischer
AIM Micro Systems GmbH (DE)

Alexandre Gatto
Carl Zeiss Jena GmbH (DE)

Reinhard Völkel
SUSS MicroOptics (CH)

SCIENTIFIC COMMITTEE (continued)

Testing for Fabrication and Assembly

CHAIRS

Jean-Michel Asfour
Dioptic GmbH (DE)

Rainer Tutsch
IPROM, Technische Universität Braunschweig (DE)

PROGRAMME COMMITTEE

- **Olivier Acher**
  Horiba Scientific (FR)
- **Lutz Aschke**
  LIMO - Lissotschenko Mikrooptik GmbH (DE)
- **Andreas Bräuer**
  Fraunhofer Institute for Applied Optics and Precision Engineering IOF (DE)
- **Keith Carlisle**
  Cranfield University (GB)
- **Roland Geyl**
  SAGEM (FR)
- **Peter Lehmann**
  Universität Kassel (DE)
- **Peter MacKay**
  Gooch and Housego (UK) Ltd. (GB)
- **Klaus Schindler**
  OptoNet e.V. (DE)
- **David Walker**
  University College London - UCL (GB)

KEYNOTE SPEAKERS

TUESDAY, 14 MAY	High-Volume Manufacturing, Micro-Optics and Structured Surfaces

09:00

Ando Makoto
Light Engine Ltd (HK)

LED-Optics Considered from the General Lighting Market

General lighting market requirement about light distribution is essential. LED is the new light source. How this new light source LED can adopt to the expected light distribution using Optics technique is the Key point. [1569713139]

TUESDAY, 14 MAY	High-Volume Manufacturing, Micro-Optics and Structured Surfaces

14:00

Ekkard Brinksmeier
LFM Laboratory for Precision Machining (DE)

Replication of Complex Optics

A consistent treatment of manufacturing process chains as well as analyzing the full set of production sequences and their interaction is a decisive measure towards predictive machining and replication of complex optics. In this keynote paper, the current state of optics manufacturing will be presented a-long with latest results from the research center on the replication of complex optical elements "SFB/ TR4". [1569712411]

WEDNESDAY, 15 MAY	Testing for Fabrication and Assembly

13:45

Robbert Bergmans
VSL Dutch Metrology Institute (NL)

Optical and tactile metrology for absolute form characterization of optical surfaces

Measuring optical surfaces to an accuracy of less than 1nm for flats and some 10s of nanometres for aspheres remains a challenge on an industrial level as of today. Thus, in September 2011, under the European Metrology Research Program a three year project started to measure high quality optical surfaces of lenses and mirrors. It encompasses a multitude of National Metrology Institutes (NMIs) and other stake holders. An overview and current status of the project titled "Optical and tactile metrology for absolute form characterization" will be given. [1569725751]

INVITED SPEAKERS

MONDAY, 13 MAY	Precise Optics Fabrication

11:15

Massimiliano Rossi
Media Lario Technologies (IIT)

Advanced Manufacturing Techniques for Precise Optics by Replication

Galvanic replication process from negative shape mandrels is the selected solution for the Optics of the approved X-ray astronomy mission eROSITA. Media Lario Technologies (MLT) is the industrial enabler for manufacturing of the Optical Payload for eROSITA - including the flight quality mandrels. Media Lario Technologies (MLT) has already adapted its proprietary manufacturing technology to successfully develop and manufacture grazing incidence collectors for Extreme Ultraviolet Lithography (EUVL). Currently, other spin-offs are under consideration with the adoption of more conventional non-metallic base materials for the optics. These approach finds application in the fields of terrestrial ast-ronomical telescopes, defence/ surveillance/medical optical systems and space earth observation. A Centre of Excellence (CoE) has been established in March 2010 is fully operational since June 2010. The centre has been established with the intention to design and fabricate mandrels/optics exploiting the technological know-how developed in scientific field and leveraging off for commercial applica-tions. [1569714079]

TUESDAY, 14 MAY	High-Volume Manufacturing, Micro-Optics and Structured Surfaces

14:30

Uwe Zeitner
Friedrich-Schiller-University Jena (DE)

Recent Advancements of High-Performance Gratings for Spectroscopic- and Laser-Applications

Gratings are essential components in different high performance optical set-ups such as spectrometers in space missions or ultra-short-pulse laser compressors. Highly efficient gratings with lateral extensions of up to 200mm or above are not unusual anymore. We provide an overview on how such gratings can be realized by electron-beam lithography and accompanying techniques like atomic-layer deposition. [1569713509]

WEDNESDAY, 15 MAY	Latest Advances in Freeform Optics

09:00

Alois Herkommer
University of Stuttgart (DE)

Freeform surfaces: Engineering standard or still exception to the rule?

Freeform optical surfaces are getting increasingly popular in imaging and illumination systems. A review of recent advances in the design, description and testing of freeform surfaces in both fields will give an impression, whether optical engineers are now enabled to make efficient and standard use of these new degrees of freedom. [1569713961]

WEDNESDAY, 15 MAY	Testing for Fabrication and Assembly

11:45

Jan Hamkens
Docter Optics GmbH (DE)

Molded freeform optics from liquid glass and gob

The Docter Optics proven business model for all kind of non imaging optics will be explained and illustrated – from optic design, engineering and construction of tools and process technology, tool shop, prototyping, sophisticated measurements and test field to mass production and logistics. [1569712119]

MONDAY, 13 MAY		Room:
09:30-10:00	**Official Congress Opening**	1, ICM
10:00-10:45	**Opening Plenary Talk** S. Hell, (Department of NanoBiophotonics - Max-Planck-Gesellschaft, DE)	
11:10-11:15	**EOSMOC 2013 - Conference Opening by the General Chairs**	B21, Exhib. Hall B2, 1st Floor
11:15-18:00	**Precise Optics Fabrication**	B21, Exhib. Hall B2, 1st Floor
11:15-12:30	**Noon session** **INVITED TALK: Advanced Manufacturing Techniques for Precise Optics by Replication** M. Rossi (Media Lario Technologies, IT)	
12:30-14:30	Lunch break	
14:30-16:00	**Afternoon session I**	B21, Exhib. Hall B2, 1st Floor
16:00-16:30	Coffee break	
16:30-18:00	**Afternoon session I**	B21, Exhib. Hall B2, 1st Floor
18:00	Get Together/Opening reception for exhibitors and congress participants	ICM Foyer

TUESDAY, 14 MAY		
09:00-16:00	**High-Volume Manufacturing, Micro-Optics and Structured Surfaces**	B21, Exhib. Hall B2, 1st Floor
09:00-10:00	**Morning session** **KEYNOTE TALK: LED-Optics Considered from the General Lighting Market** A. Makoto (Light Engine Ltd, HK)	
10:00-10:30	Coffee break	
10:30-12:00	**Noon session**	B21 ,Exhib. Hall B2, 1st Floor
12:00-14:00	Lunch break	
14:00-16:00	**Afternoon session** **KEYNOTE TALK: Replication of Complex Optics** E. Brinksmeier (LFM Laboratory for Precision Machining, DE) **INVITED TALK: Recent Advancements of High-Performance Gratings for Spectroscopic- and Laser-Applications** U. Zeitner (Friedrich-Schiller-University Jena, DE)	B21, Exhib. Hall B2, 1st Floor
16:00-16:30	Coffee break	
16:30-18:00	**Poster Session**	B0, Exhib. Hall B0

WEDNESDAY, 15 MAY		
09:00-12:00	**Latest Advances in Freeform Optics**	B21, Exhib. Hall B2, 1st Floor
09:00-10:00	**Morning session** **KEYNOTE TALK: Freeform surfaces: Engineering standard or still exception to the rule?** A. Herkommer (University of Stuttgart, DE)	
10:00-10:30	Coffee break	
10:30-12:00	**Noon session** **INVITED TALK: Molded components from liquid glass and gob** J. Hamkens (Docter Optics GmbH, DE)	B21, Exhib. Hall B2, 1st Floor
12:00-13:45	Lunch break	
13:45-16:00	**Testing for Fabrication and Assembly** **KEYNOTE TALK: Optical and tactile metrology for absolute form characterization of optical surfaces** R. Bergmans (VSL Dutch Metrology Institute, NL)	B21, Exhib. Hall B2, 1st Floor
16:00	**Student Award Ceremony**	B21, Exhib. Hall B2, 1st Floor
	End of EOSMOC 2013	

Room B21, Exhibition Hall B2, 1st Floor

11:10-11:15 **OPENING BY THE CHAIRS**

Klaus-Friedrich Beckstette
Carl Zeiss AG Jena/Oberkochen (DE)

Paul Comley
Cranfield University (GB)

11:15-18:00 **PRECISE OPTICS FABRICATION**

11:15-12:30 **NOON SESSION**

Chair: O. Fähnle, FISBA Optik AG (CH)

11:15-11:20 **Welcome by session chair**

11:15-11:45 **INVITED TALK**

Advanced Manufacturing Techniques for Precise Optics by Replication

M. Rossi, (Media Lario Technologies, IT).

Galvanic replication process from negative shape mandrels is the selected solution for the Optics of the approved X-ray astronomy mission eROSITA. Media Lario Technologies (MLT) is the industrial enabler for manufacturing of the Optical Payload for eROSITA - including the flight quality mandrels. Media Lario Technologies (MLT) has already adapted its proprietary manufacturing technology to successfully develop and manufacture grazing incidence collectors for Extreme Ultraviolet Lithography (EUVL). Currently, other spin-offs are under consideration with the adoption of more conventional non-metallic base materials for the optics. These approach finds application in the fields of terrestrial astronomical telescopes, defence/ surveillance/medical optical systems and space earth observation. A Centre of Excellence (CoE) has been established in March 2010 is fully operational since June 2010. The centre has been established with the intention to design and fabricate mandrels/optics exploiting the technological know-how developed in scientific field and leveraging off for commercial applications. [1569714079]

11:45-12:00

Atmospheric Plasma Jet Treatment of Optical Surfaces

T. Arnold (Leibniz-Institut für Oberflächenmodifizierung, DE); G. Boehm (Leibniz-Institut für Oberflächenmodifizierung, DE); H. Paetzelt (Leibniz-Institut für Oberflächenmodifizierung, DE).

Different atmospheric plasma jet tools are ready to use for the treatment of optical surfaces. Besides high rate figuring for asphericsation or free form generation as well as figure error correction with nanometre accuracy some new processes like plasma jet polishing and sacrificial plasma jet oxidation are available now. [1569713441]

12:00-12:15

Ion beam figuring precision optics for synchrotron radiation sources

L. Peverini (Thales SESO, FR); J.-J. Ferme (Thales SESO, FR); C. Du Jeu (Thales SESO, FR).

An ion beam figuring process is described for finishing a set of commercial X-ray mirrors manufactured at Thales SESO. The developed fabrication-metrology protocol is proved to tailor simultaneously both figure and finish and it allows to correct deterministically arbitrary mirror shapes. [1569716583]

12:15-12:30

ION-Finish-based error-correction of precision optics

S. Kiontke (Asphericon GmbH, DE); S. Roehl (Asphericon GmbH, DE).

The present article briefly discusses the new ION-Finish technology, refers to the dependency of the processing quality on the quality of pre-processing, and highlights currently achievable processing precisions. The process is then subjected to a critical comparison against competing methods of processing. [1569715277]

12:30-14:30 Lunch break

NOTES

Room B21, Exhibition Hall B2, 1st Floor

14:30-16:00 **AFTERNOON SESSION I**

Chair: S. Bäumer, TNO (NL)

NOTES

14:30-14:45

Development of an Industrial Robot Based Polishing Platform for Large Optical Components

X. Tonnellier (Cranfield University, GB); P. Comley (Cranfield University, GB); X. Peng (National University of Defence Technology, CN); P. Shore (Cranfield University, GB).

The implementation of a new robot based polishing system is presented. Fused silica parts with a ground surface were polished then evaluated for surface roughness and form. A surface roughness of less than 2 nm Sa was produced on 100 mm parts in 2.6 hours. [1569715119]

14:45-15:00

Optimization of grinding and polishing to gain efficiency in manufacturing silicon carbide mirrors

D. Waechter (Fraunhofer Institute for Production Technology IPT, DE).

This contribution presents the results of a systematic process optimization for grinding and polishing silicon carbide. Different grades of silicon carbide (SiC) became an established material in space-borne applications. But the manufacturing still causes high efforts and restrains an extension of application in further fields. The research project MirrorFab aims for a qualification of an optimized process chain for manufacturing mirrors made of Cesic®. This contribution presents the results of a parameter study on grinding Cesic® with diamond wheels. The benefit of the use of an ultra-precision grinding machine is evaluated. In the second part, the work takes a close look on the polishing process. The experimental results will be discussed in regard to the material removal mechanism in polishing advanced ceramics and its effects on the subsurface layer. Finally, the results are applied on ultra-precise grinding and local polishing of a two hundred millimeter mirror. [1569715227]

15:00-15:15

AFJP A review of a sub-aperture polishing technology

C. Trum (HDU-Deggendorf, DE).

This paper reports on test series concerning the "Active Fluid Jet" polishing technology. For different glass materials, pin materials and processing parameters we figured out the biggest influence on path depth and shape as an indication of the average removal rate. The implementation to industrial processes is intended. [1569717031]

15:15-15:30

The cause of structures on ground shapes

C. Vogt (University of Applied Sciences Deggendorf, DE); J. Mazal (Aalen University, DE); R.-D. Lohner (Furtwangen University, DE).

This paper reports on grinding test series with different machines, parameters and tools on silicon carbide based materials and thereby occurring surface structures. A simulation software was written to reproduce those process induced surface errors. The focus of research was the generated structures and their triggers. [1569714737]

15:30-15:45

Thin glass shell: a new type of optical component

R. Geyl (SAGEM, FR); F. Poutriquet (Reosc, FR).

Sagem-Reosc is working since several years on large but thin glass shells for lightweight mirrors, active or adaptive optics. We recently delivered ESO with the convex aspheric thin glass shell for the VLT M2 Adaptive Optics mirror unit: this is a 1-m aperture, 2 mm thin, convex aspheric shell made to precise specifications. We also made the demonstration for ESO E-ELT AO M4 mirror of the capability to produce 2.5-m diameter large, plano, 2 mm thin glass shell. Our paper will introduce to the use of such thin glass shells for space and astronomy and report the work done. [1569714317]

15:45-16:00

A measurement based method to classify grinding tool conditions

C. Vogt (University of Applied Sciences Deggendorf, DE); M. Rohrbacher (University of Applied Sciences Deggendorf, DE).

This paper reports on a method that can be used to classify the condition of grinding tools by measuring the tools topography. Truing and dressing of grinding tools is an important procedure within manufacturing processes. A common method to evaluate the state of a grinding tool is to measure the process forces or tool displacement. This is not always possible and in addition to that the grinding gives no information about the tool condition. [1569716997]

16:00-16:30 Coffee break

Room B21, Exhibition Hall B2, 1st Floor

16:30-18:00 **AFTERNOON SESSION II**

Chair: A. Schindler, Leibniz-Institute of Surface Modification - IOM(DE)

NOTES

16:30-16:45
Fabrication of optical elements by laser-induced front side etching methods
P. Lorenz (IOM Leipzig, DE); K. Zimmer (IOM Leipzig, DE); M. Ehrhardt (IOM Leipzig, DE); F. Frost (IOM Leipzig, DE).
Laser-induced front side etching is a method for nanometer-precision laser etching of transparent materials using thin absorber layers. The fabrication of optical elements up to several cm and with a minimal feature size below one micrometer and with etching depths ranging from nm to a few 10 μm are shown [1569714747]

16:45-17:00 STUDENT PRESENTATION
Laser-Based Optics Manufacturing
S. Heidrich (Fraunhofer-Institute for Laser Technology ILT, DE); A. Richmann (RWTH Aachen University, DE); E. Willenborg (Fraunhofer-Institute for Laser Technology ILT, DE).
Current results of the development of a laser based process chain for optics manufacturing are presented. This process chain is especially suited for manufacturing aspherical and free form optics because of its short processing time which is independent from the surface shape. [1569711755]

17:00-17:15
Laser and Plasma processing for direct writing of high quality optical surfaces
P. Lorenz (IOM Leipzig, DE); M. Ehrhardt (IOM Leipzig, DE); K. Zimmer (IOM Leipzig, DE); T. Arnold (Leibniz-Institut für Oberflächenmodifizierung, DE); H. Paetzelt (Leibniz-Institut für Oberflächenmodifizierung, DE).
An emerging fabrication process for refractive optical surfaces consisting of laser direct writing and plasma polishing is presented. The high flexibility of this approach results from the direct writing capabilities of the laser process and the effective shape maintaining smoothing by local plasma jet polishing. [1569714753]

17:15-17:30 STUDENT PRESENTATION
The Use of Cold Laser Ablation for Optics Manufacturing
C. Schindler (EAH Jena, DE); J. Bliedtner (EAH Jena, DE); S. Wächter (ifw Jena, DE); M. Friedrich (ifw Jena, DE); V. Giggel (Carl Zeiss Jena GmbH, DE).
Non-thermal interaction and non-linear absorption are the key benefits for cold ablation of dielectrics. An ultra shortpulsed laser process step for shaping complex optical surfaces into glass is introduced and defined. The laser treatment can be applied locally and results in fine-ground surface quality. [1569714415]

17:30-17:45
Fabrication of grating structures into copper surfaces by laser embossing
P. Lorenz (IOM Leipzig, DE); K. Zimmer (IOM Leipzig, DE); M. Ehrhardt (IOM Leipzig, DE); F. Frost (IOM Leipzig, DE); J. Zajadacz (IOM Leipzig, DE); R. Fechner (IOM Leipzig, DE).
The fabrication of grating patterns into copper surfaces by replication of a submicron master patterns using laser embossing is presented. The embossed 3D submicron grating structures are accurate except the slightly reduction of the patterns height compared to the master. [1569714751]

17:45-18:00
Aspherical optical components - from design to fabrication
U. Fuchs (Asphericon GmbH, DE).
When designing a focusing lens an asphere is a perfect solution. However, when it comes down to fabrication a whole new class of error types has to be considered. It is demonstrated how those can be implemented into the optical design process in order to give a reliable prediction on how the asphere will perform on its one or within a complex optical system. This serves as a basis for optimizing optical systems, too. [1569715283]

18:00 **"GET TOGETHER" Trade Fair and Congress** tba.
Open to all attendees of the World of Photonics Congress 2013.

Room B21, Exhibition Hall B2, 1st Floor

09:00-16:00 HIGH-VOLUME MANUFACTURING, MICRO-OPTICS AND STRUCTURED SURFACES

NOTES

09:05-10:00 MORNING SESSION

Chair: A. Gatto, Carl Zeiss Jena GmbH (DE)

09:00-09:05 **WELCOME BY SESSION CHAIR**

09:00-09:30 **KEYNOTE TALK**

LED-Optics Considered from the General Lighting Market

A. Makoto (Light Engine Ltd, HK).

General lighting market requirement about light distribution is essential. LED is the new light source. How this new light source LED can adopt to the expected light distribution using Optics technique is the Key point. [1569713139]

09:30-09:45

Silica micro-optical components for close-packed circular arrays of single-mode laser sources

H. Baker (Heriot-Watt University, GB); A. Mckay (Macquarie University, AU); D. Hall (Heriot-Watt University, GB); N. Trela-McDonald (PowerPhotonic Ltd, GB); J. Wendland (PowerPhotonic Ltd, GB).

Free-form, laser-machined and polished micro-optical surfaces are demonstrated that convert linear arrays of single-spatial-mode laser sources into a circular cross-section bundle with minimum M2. Operation in either transmission or with high-reflection coatings allows silica substrates to be applied to a wide range of wavelengths. [1569714761]

09:45-10:00

Verifying Optical performance of UV curing materials for micro optics and their placement accuracy using passive and active alignment processes

A. Kraft (DELO Industrial Adhesives, DE).

Demand in mobile application becomes higher and increasing functionality is the key for success in today's product design, more and more sensors will be built into this kind of new devices. As optical and imaging functions are considered core features, a lot of these new functions are realized using miniaturized or micro optics. In the last decade, micro optics manufacturing have reached a high level of confidence and are supposed to be one of the manufacturing technologies to address future requirements for even smaller and thinner devices. In this report we will look at the increasing requirements in optical performance of UV curing materials for lens imprinting, as well as the challenges for higher placement accuracy to assure the optical performance in LED and camera applications. Results of printed micro lenses, as well as placement accuracy in active and passive alignment processes will be shown [1569714985]

10:30-12:00 NOON SESSION

Chair: R. Völkel, SÜSS MicroOptics (CH)

10:30-10:45 **STUDENT PRESENTATION**

Volume Holographic Gratings for astronomy based on solid photopolymer

A. Zanutta (INAF - Osservatorio Astronomico di Brera, IT); A. Bianco (INAF - Osservatorio Astronomico di Brera, IT).

Solid photopolymers have been studied in order to produce volume holographic gratings to be used as dispersing elements in astronomical instrumentations. They have been characterized determining the parameters that affect the grating efficiency. Moreover dispersing elements based on VHGs have been produced. [1569714759]

Room B21, Exhibition Hall B2, 1st Floor

10:45-11:00 STUDENT PRESENTATION

Micro-Rod Arrays as 2D Photonic Crystal Structures for Light Trapping and Guiding

C. Kraeh (Technische Universität München, DE); A. Popescu (Siemens AG, DE); H. Hedler (Siemens AG, DE); M. Zeitlmair (Technische Universität München, DE); J. Finley (TU München, DE).

We report on the creation of 2D photonic crystal structures made of high aspect ratio Si micro-rod arrays. These structures feature TM bandgaps and can contain point and line defects for light trapping and guiding. [1569714233]

11:00-11:15

Next Generation Optics - Asphero-Diffractive Glass Lenses

M. Doetz (Fraunhofer IPT, DE); K. Schulz (Fraunhofer IPT, DE); O. Dambon (Fraunhofer Institute for Production Technology IPT, DE); F. Klocke (Fraunhofer Institute for Production Technology IPT, DE).

The technology of precision glass molding provides a good alternative to the traditional production method of grinding followed by polishing for the production of optical glass components. Particularly for the production of complex optical glass lenses such as diffractive optical elements, aspheric lenses, free-form lenses or lens arrays in medium and large quantities precision glass molding is an economical technology. [1569716625]

11:15-11:30 STUDENT PRESENTATION

Near-field study of dielectric surface lens

L. Yu (Optics & Photonics Technology Laboratory, École Polytechnique Fédérale de Lausanne (EPFL), CH); V. Paeder (Optics & Photonics Technology Laboratory(EPFL), CH); E. Barakat (Optics & Photonics Technology Laboratory (EPFL, CH).

In this work, we design, fabricate and experimentally characterize a surface structured lens within an ultra thin polymer layer deposited on a Bloch Surface Waves (BSWs) suspended dielectric platform. The near-field (SNOM) measurements demonstrate that the lens is able to manipulate the propagation of the surface waves. Experimental result shows good agreement with the simulation calculated using the finite difference time-domain (FDTD). This work opens a way to realize surface structured integrated all-optical systems and the study of fundamental optical phenomena. [1569717123]

11:30-11:45 STUDENT PRESENTATION

Iterative scalar algorithm for the rapid design of wide-angle diffraction Fourier elements

G. Nam Nguyen (Telecom Bretagne, FR).

We demonstrate that non-paraxial Fourier elements can be designed by an iterative Fourier transform algorithm with the help of a simple projection step. The element designed by this model shows better reconstruction in both spots position and power distribution than the one of the paraxial design and very close to the desired pattern. [1569716913]

12:00-14:00 Lunch break

14:00-16:00 **AFTERNOON SESSION**

Chair: tba.

14:00-14:30 KEYNOTE TALK

Replication of Complex Optics

E. Brinksmeier (LFM Laboratory for Precision Machining, DE); F. Klocke (Fraunhofer Institute for Production Technology IPT, DE); L. Schönemann (LFM Laboratory for Precision Machining, DE).

A consistent treatment of manufacturing process chains as well as analyzing the full set of production sequences and their interaction is a decisive measure towards predictive machining and replication of complex optics. In this keynote paper, the current state of optics manufacturing will be presented along with latest results from the research center on the replication of complex optical elements "SFB/TR4". [1569712411]

NOTES

Room B21, Exhibition Hall B2, 1st Floor

14:30-15:00 **INVITED TALK**

Recent Advancements of High-Performance Gratings for Spectroscopic- and Laser-Applications

U. Zeitner (Friedrich-Schiller-University Jena, DE); F. Fuchs (Fraunhofer IOF, DE); M. Oliva (Fraunhofer IOF, DE); E.-B. Kley (Friedrich-Schiller-University Jena, DE).

Gratings are essential components in different high performance optical set-ups such as spectrometers in space missions or ultra-short-pulse laser compressors. Highly efficient gratings with lateral extensions of up to 200mm or above are not unusual anymore. We provide an overview on how such gratings can be realized by electron-beam lithography and accompanying techniques like atomic-layer deposition. [1569713509]

15:00-15:15

Continuous progress in free-form micro-optics capabilities enables novel applications in beam shaping

O. Homburg (LIMO Lissotschenko Mikrooptik GmbH, DE); L. Aschke (LIMO GmbH, DE).

LIMO's wafer-based production technology is based on computer-aided design and involves no etching at all. Thus, a large variety of optical materials can be structured with free-form lens surfaces. Assembling aids can be integrated in the design. Novel micro-optics concepts are demonstrated in complex beam shaping applications. [1569711927]

15:15-15:30

High Throughput high Accuracy Laser Soldering of opto-electronic Chips

T. Vahrenkamp (FiconTEC Service GmbH, DE); A. Weber (FiconTEC Service GmbH, DE); D. Rose (FiconTEC Service GmbH, DE); S. Heinecke (FiconTEC Service GmbH, DE); M. Seyfried (FiconTEC Service GmbH, DE).

A fast and high accurate approach for the assembly of opto-electronic chips was developed and demonstrated based on a laser soldering process. This new technology will serve the needs of future silicon photonics applications. [1569712467]

15:30-15:45

Laser based fabrication of high precision fused silica phase masks

T. Fricke-Begemann (Laser-Laboratorium Göttingen e. V., DE); J. Meinertz (Laser-Laboratorium Göttingen e.V., DE); M. Wiesner (Laser-Laboratorium Göttingen e. V., DE); J. Ihlemann (Laser-Labo-ratorium Göttingen e.V., DE).

Medium period (~ 10 μm) fused silica phase masks are used for beam splitting or in projection systems for efficient laser machining. They are made by laser patterning of SiOx (x<2) with subsequent oxidation to SiO2. For optimum performance, both processes have to be adapted to the optical properties of the respective SiOx-layer. [1569714675]

15:45-16:30 Coffee break

16:30-18:00 **POSTER SESSION** Room B0, Exhib. Hall B0, Ground Floor

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NOTES

Room B21, Exhibition Hall B2, 1st Floor

09:00-12:00 LATEST ADVANCES IN FREEFORM OPTICS

NOTES

09:00-10:00 MORNING SESSION

Chair: S. Kiontke, asphericon (DE)

09:00-09:05 **WELCOME BY SESSION CHAIR**

09:00-09:30 **INVITED TALK**

Freeform surfaces: Engineering standard or still exception to the rule?

A. Herkommer (University of Stuttgart, DE).

Freeform optical surfaces are getting increasingly popular in imaging and illumination systems. A review of recent advances in the design, description and testing of freeform surfaces in both fields will give an impression, whether optical engineers are now enabled to make efficient and standard use of these new degrees of freedom. [1569713961]

09:30-09:45

Free Form Surfaces are standardizable?

D. Jahn (Carl Zeiss AG, DE).

A freeform surface is any complex surface. What is the motivation to take this to an international standard? How can we do that and which advantages could be the results? A summary of the ISO optical free form standard and its history is given. [1569718171]

09:45-10:00

Metrology of freeform optics using diffractive null element in Shack-Hartmann sensor

G.S. Khan (Indian Institute of Technology Delhi, India); M. Bichra (Technische Universität Ilmenau, DE); A. Grewe (Technische Universität Ilmenau, DE); N. Sabitov (Technische Universität Ilmenau, DE); K. Mantel (Max Planck Institute for Science of Light, DE); I. Harder (Max Planck Institute for Science of Light, DE); A. Berger (Friedrich-Alexander-Universitat Erlangen-Nurnberg, DE); N. Lindlein (Friedrich-Alexander-Universitat Erlangen-Nurnberg, DE); S. Sinzinger (Technische Universität Ilmenau, DE).

The paper presents the testing of freeform optics using a Shack-Hartmann sensor. A cubic phase plate has been selected as a freeform surface to test. A diffractive optical element is used as a null element for the freeform optics. The experimental results using a Shack-Hartmann sensor are compared with other testing methods. [1569714777]

10:00-10:30 Coffee break

10:30-12:00 NOON SESSION

Chair: W. Ulrich, Carl Zeiss AG (DE)

10:30-10:45

Fast Design of Freeform Optics

N. Siedow (Fraunhofer ITWM, DE).

We present a mathematical method for fast design of freeform optical elements like lenses and reflectors. It is based on the numerical solution of partial differential equations and implemented into an appropriate software tool. Examples show the capability of the presented method. [1569714615]

10:45-11:00

Fabricating monolithic structures from separate piece parts

P.E. MacKay (Gooch and Housego (UK) Ltd., GB); N.L. Beveridge (Gooch and Housego (UK) Ltd, GB); T. Wood (Surrey Satellite Technology Ltd, GB); C. Killow (Glasgow University, GB).

As part of a KTP scheme the Institute of Gravitational Research at Glasgow University have been transferring their adhesive free bonding techniques to Gooch and Housego. We present the results of the transfer and development program including its application to space, UV and high laser fluence optics. Protoptye mirror structures have been constructed that are not realisable by other technqies and that offer the best compromise between lightweighting, surface form stability and cost effectiveness in manufacture. [1569714943]

11:00-11:15

Aspherical cylinders in series production as a precursor to freeform manufacturing

S. Kiontke (Asphericon GmbH, DE); Stefan Roehl (Asphericon GmbH, DE).

The manufacturing of freeform surfaces represents many challenges for production technology. The manufacturing of aspherical cylinders acts as a preliminary stage. A successful CNC-based series production of aspherical cylinders, major development steps and results are presented in addition to areas of application. [1569715299]

Room B21, Exhibition Hall B2, 1st Floor

11:15-11:30
Integrated Manufacturing of Freeform Surfaces
F. Niehaus (Schneider GmbH & Co. KG, DE); S. Huttenhuis (Schneider GmbH & Co. KG, DE).
The machining of freeform surfaces is currently characterized by several production steps and data conversions which are both time consuming and increase surface form errors. The UPC 400 integrates multiple process steps including diamond turning, milling, and metrology, and an innovative method for data handling into a single machine platform for manufacturing precision freeform surfaces. This approach requires only a single clamping set-up which significantly reduces production time and geometrical errors. Furthermore, the need to convert data for different processes is eliminated. This results in decreased manufacturing time and increased machining accuracy of freeform optics. [1569716499]

11:30-11:45
Diamond machining of freeform optics with well-defined reference structures
S. Risse (Fraunhofer Institute for Applied Optics and Precision Engineering IOF, DE).
Optical designs in various applications profit from the increasing use of freeform components. Ultraprecise machining especially modern servo-assisted diamond machining represents a production technique of off-axis aspheres and freeforms with reduced surface shape deviation. Ultra-precise machining is an appropriate method to realize optical freeforms. Surfaces with reduced deviations can be fabricated in a deterministic process by using reference structures and correction loops. Freeform components, however, do not only require small value of surface deviation, they also require low tolerances of the surface position regarding the reference marks as well as the handling and mounting structures itself. A close relation between the optical and the mechanical coordinate systems is mandatory for ultra-precise manufacturing, metrology, and assembly of the surface in the optical path. Diamond machining offers an excellent technology to meet this requirement. In this respect, single point diamond turning is an efficient and multifaceted tool. [1569725581]

11:45-12:00 **INVITED TALK**
Molded components from liquid glass and gob
J. Hamkens (Docter Optics GmbH, DE).
The Docter Optics proven business model for all kind of non imaging optics will be explained and illustrated - from optic design, engineering and construction of tools and process technology, tool shop, prototyping, sophisticated measurements and test field to mass production and logistics. [1569712119]

12:00-13:45 Lunch break

13:45-16:00 TESTING FOR FABRICATION AND ASSEMBLY

Chairs: *Jean-Michel Asfour, Dioptic GmbH (DE)*
Rainer Tutsch, IPROM, Technische Universität Braunschweig (DE)

13:45-13:50 **WELCOME BY SESSION CHAIRS**

13:45-14:15 **KEYNOTE TALK**
Optical and tactile metrology for absolute form characterization of optical surfaces
R. Bergmans (VSL Dutch Metrology Institute, NL); P. Křen (Cesky Metrologicky Institut, CZ); H. Nouira (Laboratoire National de Métrologie et d'Essais, FR); M. Schulz (Physikalisch-Technische Bundesanstalt, DE).
Measuring optical surfaces to an accuracy of less than 1nm for flats and some 10s of nanometres for aspheres remains a challenge on an industrial level as of today. Thus, in September 2011, under the European Metrology Research Program a three year project started to measure high quality optical surfaces of lenses and mirrors. It encompasses a multitude of National Metrology Institutes (NMIs) and other stake holders. An overview and current status of the project titled "Optical and tactile metrology for absolute form characterization" will be given. [1569725751]

14:15-14:30
Strategies for the interferometric test of large flats
G. Pariani (INAF - Osservatorio Astronomico di Brera, IT); R. Briguglio (INAF - Osservatorio Astrofisico di Arcetri, IT); M. Xompero (INAF - Osservatorio Astrofisico di Arcetri, IT); A. Riccardi Briguglio (INAF - Osservatorio Astrofisico di Arcetri, IT).
Different configurations to realize a full-aperture measurement at normal incidence of meter-class flat mirrors have been studied, basing the setup on parabolic or spherical collimating mirrors. A demonstration test of a 30 cm flat mirror in the most promising setup (spherical mirror plus CGH) has been realized and operated with good results. [1569716619]

NOTES

Room B21, Exhibition Hall B2, 1st Floor

14:30-14:45
Optical testing of eyeglasses with novel measurement concept for wavefront scanning
S. Stuerwald (Fraunhofer IPT, DE); R. Schmitt (Laboratory for Machine Tools and Production Engineering WZL, DE).
For functional testing of optics wavefront characterisation is a robust and flexible measurement method with low demands concerning environmental conditions. Here, a novel approach for a scanning wavefront measurement system is presented which is based on a MOEMS-device for increasing the dynamic range of the test setup. [1569717133]

14:45-15:00
Optical Test Bench for High Precision Metrology and Alignment of Zoom Sub-Assembly Components
F. Leprêtre (THALES ANGENIEUX, FR); E. Levillain (THALES ANGENIEUX, FR); B. Wattellier (PHASICS SA, FR); P. Delage (PHASICS SA, FR); D. Brahmi (PHASICS SA, FR); A. Gascon (PHASICS SA, FR).
The development of a metrology test bench dedicated to the characterization of lens sub-assemblies for zoom objectives is addressed. Such a bench is able to measure with an absolute precision better than 100 nm PV, F/2 lenses with spherical aberration as high as 30 μm at 633 nm. [1569712529]

15:00-15:15
Metrology for Asphere, Freeform and Wafer level optics by UA3P
K. Kubo (Panasonic Production Technology Co., Ltd., JP); D. Ramm (Panasonic Factory Solutions Europe, DE).
Recently the demand of the metrology for large asphere and freeform are increasing for digital camera and other area. We have developed new technology having the accuracy is less 0.1um and scanning speed is 20mm/s. And we have developed special unit and function for this machine to measure 4,000 lens on the single wafer. [1569714493]

15:15-15:30
Interferometric testing of optical angular scales and structures
V. Khomutov (Diffraction JSC, RU); A. Poleshchuk (Institute of Automation and Electrometry SB RAS, RU); R. Nasyrov (Institute of Automation and Electrometry SB RAS, RU).
The application of a Fizeau interferometer for quality check of angular scales, optical limbs, raster etc. fabricated by means of precision laser writer system CLWS-300IAE is discussed. Computer simulation and experimental results are presented. [1569717005]

15:30-15:45
The characterisation of CSP parabolic mirrors using photogrammetry
P. King (Cranfield University, GB); P. Comley (Cranfield University, GB); C. Sansom (Cranfield University, GB).
This paper describes the use of a highly portable photogrammetry technique for measuring the position and form of large mirror segments for solar collectors. The accuracy of the technique has been validated using a large Coordinate Measuring Machine (CMM) with results showing a positional accuracy of better than 100 μm. [1569715307]

15:45-16:00
Characterization of etch depth uniformity for phase binary holograms fabrication
V. Korolkov (Institute of Automation and Electrometry SB RAS, RU); A. Konchenko (Institute of Automation and Electrometry SB RAS, RU); N. Mironnikov (Novosibirsk State University, RU); V. Cherkashin (Institute of Automation and Electrometry SB RAS, RU).
A spectral scattering method of etch depth measurement for binary phase computer generated holograms has been offered. The setup designed to realize the method using fiber spectrometer and motorized scanning XY stage allows one to obtain the etch depth map of large hologram for a few minutes. Depth measurement inaccuracy can reach 1% for depths from 300 to 7000 nm. [1569717033]

16:00 Student Award Ceremony

End of EOSMOC 2013

NOTES

POSTER SESSION | 16:30 - 18:00 | Room B0, Exhib. Hall B0; Ground Floor

1569711943_001
FEM simulation for injection molding high precision freeform optics
L. Dick (Company of Optics Production, DE).
The poster will describe a FEM simulation of an injection molding process for a high precision freeform optic. In result, interesting physical questions can be solved and compared with the reality. In many cases a very good analogy can be seen.

1569713935_002 STUDENT PRESENTATION
Design optimization of light emitting diode module «chip-on-board» for increase light extraction
S. Lipnitskaya (NRU Information Technologies, Mechanics and Optics, RU); K. Mynbaev (NRU of Information Technologies, Mechanics and Optics, RU); L. Nikulina (Optogan Group, RU); J. Ramchen (Optogan Group, RU); V. Bougrov (Optogan Group, RU); A. Kovsh (Innolume GmbH, DE); M. Odnoblyudov (Optogan Group, RU); A. Romanov (Optogan Group, RU).
In the present research we optimize the design of light emitting diode module produced using «chip-on-board» (COB) technology to reduce light energy losses in elements of the module. Optimization was performed using numerical simulations and experimental research of COB samples.

1569714049_003 STUDENT PRESENTATION
Holographic optical elements for holographic indicators of sighting and flight information and methods of their production
A. Solomashenko (Bauman Moscow State Technical University, RU); S. Odinokov (Bauman Moscow State Technical University, RU); H. Sagatelyan (Bauman Moscow State Technical University, RU); V. Markin (Bauman Moscow State Technical University, RU).
The holographic optical elements for miniature indicators and methods of their production on the photo-sensitive materials and on the glass are described

1569714185_004
High-NA EUV projection lens with central obscuration
A. Zhevlakov (Vavilov State Optical Institute, RU); A. Bagdasarov (Vavilov State Optical Institute, RU); R. Seisyan (Ioffe Physical Technical Institute, RU).
EUV projection lens consisting of four coaxial mirrors with a Numerical Aperture of 0.485 and a twelve-fold demagnification has been developed. According to the computation the circuit features at 10 nm in center and 20 nm on the edge of 12.4 mm field of view can be imaged. The scheme of the projection lens with such demagnification promotes the production of the defect-less masks and reduction of their cost

1569714597_005 STUDENT PRESENTATION
A built-in spectrograph with transmission concave holographic grating
E. Muslimov (Kazan National Research Technical University, RU).
A design of spectrograph with a transmission concave holographic grating is presented. It's shown that this spectrograph can be easily coupled with another optical system. Advantages of proposed design are illustrated by an example.

1569714653_006
High pressure fluid jet polishing of advanced materials
J. Mazal (Aalen University, DE); R. Boerret (Aalen University, DE).
An improved fluid jet polishing setup is used for the machining of different advanced materials. The setup is described and the results of the first machining experiments are presented and discussed. An outlook is given of possible steps to further improve the setup and therefore the overall process performance.

1569714661_007
Robot polishing of metal materials for the optical industry
M. Speich (Aalen University, DE); R. Boerret (Aalen University, DE); D. Harrison (Glasgow Caledonian University, GB); A. DeSilva (Glasgow Caledonian University, GB).
The goal of this work is to replace manual polishing with robot polishing; or at least to mostly replace manual polishing and to reach a surface quality of approx. 95% of the specification with the automatic robot polishing. Therefore a new process has been developed to substitute manual polishing and other process steps. Introduction

NOTES

POSTER SESSION | 16:00 - 18:00 | Room B0, Exhib. Hall B0; Ground Floor

1569714669_008
Subsurface Damage Measurement
D. Wiedemann (Aalen University, DE); R. Boerret (Aalen University, DE).
The manufacturing process of optics with a high surface finish is characterized by several factors. One very important step during the fabrication is removing the so called Subsurface Damage which result from the grinding process. The following abstract shows a non-destructive, possible in-line measurement technique to measure and evaluate Subsurface Damage on optics.

1569714693_009
Photoresist analysis for submicrometric material processing with laser interference lithography
T. Tavera (CEIT-ik4, ES); N. Pérez (CEIT-ik4, ES); A. Rodriguez (CIC-Microgune, ES); S. Olaizola (CEIT-ik4, ES).
This work analyses the use of three commercially available photoresists in laser interference lithography processes. The limitations of the different photoresists are discussed. A method of minimization of the standing wave by process optimization is also presented. Finally, a fabrication processes for 200nm metallic gratings is described.

1569714705_010
Machine complex for processing the high accuracy aspherical high-aperture optics of free form surface of diameter 100-600 mm
A. Semenov (JSC LZOS, RU); M. Abdulkadyrov (JSC LZOS, RU); A. Patrikeev (JSC LZOS, RU); V. Patrikeev (JSC LZOS, RU).
The complex includes the testing means which operate on the basis of mechanical and optical methods, lens and CGH wavefront corrector, 3-D measuring machines, machines with canting and rotary tables to process high aperture aspherical surfaces of the optical parts with a diameter up to 600 mm.

1569714713_011
Fabrication of Adhesive Lenses Using Free Surface Shaping
D. Hoheisel (Leibniz Universität Hannover, DE); M. Wall (Leibniz Universität Hannover, DE); C. Kelb (Leibniz Universität Hannover, DE); B. Roth (Leibniz Universität Hannover, DE); L. Rissing (Leibniz Universitaet Hannover, DE).
Two approaches for fabricating polymer lenses are presented in this paper. Both are based on filling circular holes with UV cured adhesives. Initially, the viscous adhesive material creates a liquid and spherical free surface due to its own surface tension. This shape is then preserved by curing with UV-hardening light.

1569714815_012 STUDENT PRESENTATION
Efficient Process for Microprism Manufacturing
C. Schindler (EAH Jena, DE); J. Bliedtner (EAH Jena, DE); J. Schweickert (Optotech Optikmaschinen GmbH, DE); M.s Kuntze (Optotech Optikmaschinen GmbH, DE); R. Mandler (Optotech Optikmaschinen GmbH, DE).
Based on conventional lapp machinery a kinematic method for lapping and polishing edge-sharp microprisms and plano optics is developed. The constructive principle is modular and applicable on different part geometries.

1569714779_013
Fabrication and Experimental Results of MEMS Polymeric Low Vacuum Pressure Sensor based on SU-8
H. Latifi (University of Shahid-Beheshti, IR); O. Rnjbar (Laser and Plasma Institute Shahid Beheshti University Evin Tehran IR, IR); M. Taghavi (Laser and Plasma Institute, Shahid Beheshti University, IR); F.B. Azar (Laser and Plasma Institute, Shahid Beheshti University, IR); M. Zibaei (Laser and Plasma Institute Shahid Beheshti University Evin Tehran IR, IR).
In this paper, fabrication and measurement of low vacuum pressure sensor by used of SU8 based MEMS diaphragm is reported. The sensor was fabricated by photolithography technique. The thickness of diaphragm is 10 um and it was coated by copper. The sensitivity of sensor to low vacuum pressure is -0.4282 nm/torr and has 0.02 torr resolution.

NOTES

POSTER SESSION | 16:00 - 18:00 | Room B0, Exhib. Hall B0; Ground Floor

1569714279_014
Fabrication and Optical Testing of SU-8 Based MEMS Accelerometer
H. Latifi (University of Shahid-Beheshti, IR); F.B. Azar (Laser and Plasma Institute, Shahid Beheshti University, IR); M. Taghavi (Laser and Plasma Institute, Shahid Beheshti University, IR); M. Sadegh cheri (Laser and Plasma Institute, Shahid Beheshti University, IR); A. Mousavian (Laser and Plasma Institute, Shahid Beheshti University, IR).
In this paper we report the fabrication and optical testing of SU-8 based MEMS accelerometer. The Fabricated accelerometer by photolithography technique consists of a rectangular proof mass which is suspended on bases using four L shape beams. The sensor sensitivity and resolution are 137 μm/g and 36 mg, respectively.

1569716899_015
Fabrication of SU-8 based MEMS Microphone
H. Latifi (University of Shahid-Beheshti, IR); M. Peysokhan (Laser and Plasma Institute, Shahid Beheshti University, IR); F.B. Azar (Laser and Plasma Institute, Shahid Beheshti University, IR); M. Taghavi (Laser and Plasma Institute, Shahid Beheshti University, IR); Y. Silani (Laser and Plasma Institute, Shahid Beheshti University, IR); M. Salehi moghaddam (Laser and Plasma Institute, Shahid Beheshti University, IR); E. Saei (Laser and Plasma Institute, Shahid Beheshti University, IR).
In this paper we present fabrication of a MEMS microphone sensor as well as response test for the device. The sensor is a rectangular cantilever with dimensions of 400um× 130um and 10 um thickness. For fabrication, standard Photolithography technique is used. Testing of the sensor is optical method and the sensor has a good response in frequency range from 50 Hz to 12 KHz.

1569716929_016
Fabrication of an Optical MEMS Thermometer Using Photolithography Technique
H. Latifi (University of Shahid-Beheshti, IR); Y. Silani (Laser and Plasma Institute, Shahid Beheshti University, IR); M. Taghavi (Laser and Plasma Institute, Shahid Beheshti University, IR); F.B. Azar (Laser and Plasma Institute, Shahid Beheshti University, IR); M. Peysokhan (Laser and Plasma Institute, Shahid Beheshti University, IR); H. Shahraki (Laser and Plasma Institute, Shahid Beheshti University, IR).
In this work, we present fabrication and interferometric optical testing of a MEMS thermometer. Fabricated device consists of rectangular beam of 2.4mm×0.38mm in size which is suspended on bases. All the components of the device are fabricated using photolithography technique. The sensitivity and resolution of the sensor are 168 um/co and 0.03 co, respectively.

1569717041_017
Diffractive optical elements for aperture apodization
A. Poleshchuk (Institute of Automation and Electrometry SB RAS, RU); A. Sedukhin (Institute of Automation & Electrometry SB RAS, RU); N. Nikanorov (Novosibirsk Instrument Making Enterprise, RU).
Novel structures of zero-order DOEs for light apodization in imaging and beam shaping optical systems are proposed and investigated. The main features of these structures are the high constancy of the spatial frequencies of the DOEs over their apertures and a slow variation of the fill factors of the cells of the DOEs.

1569717057_018 STUDENT PRESENTATION
Fabrication of two-dimensional diffraction structure in thin As - Ge - S/Ag films as platform for optical sensing
A. Lalova (Institute of Optical Materials and Technologies, BG).
We report experimental results on the fabrication and characterization of two-dimensional (2D) diffraction structure in thin Ag/As - Ge - S films. The recorded relief gratings were covered with thin gold film. The sensitivity of the recorded structure for detection of small amounts of chloroform, alcohol and SO2 is demonstrated.

NOTES

SYNOPSIS

Optofluidics merge optics and fluidics from the micro- to the nanoscale and enable new functionalities.

Emerging fields of optofluidic research and applications may be found in the sector of sustainability energy, advanced chip-based sensor technology, and biophotonic handling and analysis in fluid media.

The 1st EOS Conference on Optofluidics was a great success, with participation from leaders in the optofluidics community from around the world. This 2nd EOS conference will build on that momentum, exploring the latest developments in the field of optofluidics, and connecting experts from academia, start-ups and established companies.

SCIENTIFIC COMMITTEE

GENERAL CHAIRS

David Sinton
University of Toronto (CA)

David Erickson
Cornell University (US)

Timo Mappes
Carl Zeiss AG (DE)

Demetri Psaltis
Ecole Polytechnique
Fédérale de Lausanne (CH)

Andreas Vasdekis
Pacific Northwest
National Laboratories (US)

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  Ecole Polytechnique (FR)
- **Romeo Bernini**
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- **Anders Kristensen**
  Technical University of Denmark (DK)
- **Uriel Levy**
  The Hebrew University of
  Jerusalem (IL)
- **Markus Pollnau**
  University of Twente (NL)
- **Romain Quidant**
  ICFO (ES)

SPECIAL OPTOFLUIDICS INVITED INDUSTRY SESSION

Upon invitation of the US American company Optofluidics Inc., industry experts from Festo AG, GE Global Research, and LioniX BV will speak on their technology, the challenges of bringing optofluidic technologies to market, and the commercialisation opportunities for optofluidics ahead.

Date: Tuesday, 14 May, 14:00-16:00h
Location: Room 22 (ICM, 2nd floor)

KEYNOTE SPEAKER

MONDAY, 13 MAY

11:00

Andy Yun
Harvard Medical School (US)

Biomaterial Photonics

Light is clearly an attractive form of energy from medical application perspectives. However, a common problem in photomedicine is the difficulty to deliver light efficiently into tissues in vivo. Here, we discuss two forward looking approaches based on biological light sources and optical waveguides made of biopolymers. [1569729723]

INVITED SPEAKERS

MONDAY, 13 MAY

14:30

Holger Schmidt
UC Santa Cruz (US)

Optofluidic platform for particle analysis and manipulation

I will discuss the principles of an optofluidic platform based on liquid-core antiresonant reflecting optical (ARROW) waveguides for particle analysis and manipulation. Applications, in particular amplification-free detection of pathogenic nucleic acids will be considered. [1569715483]

16:30

Ai Qun Liu
Nanyang Technological University (SG)

Optofluidic Transmission Optics

In this paper, the state-of-the-art of optofluidic research is reviewed, including breakthrough innovations in optical and photonic devices, the high potential applications of optofluidics in biophysical, biochemistry and biomedical studies. [1569721655]

TUESDAY, 14 MAY

09:30

Reuven Gordon
University of Victoria (CA)

Optofluidics with Nanoapertures in Metal Films

This talk will review recent advances in: nanohole surface plasmon resonance sensing allowing for 10E-7 refractive index unit resolution, and double nanohole optical trapping allowing for the interaction of single proteins with antibodies. [1569715627]

10:30

Christopher Howe
University of Cambridge (GB)

Algal biotechnology and photobioreactor design

Criteria influencing the design of photobioreactors for algal biotechnology are discussed. The biology of the organisms involved, and the uses to which they will be put, will influence the most appropriate design of photobioreactor, so a multidisciplinary approach, including life cycle analysis, is essential. [1569716645]

WEDNESDAY, 15 MAY

09:00

Roberto Osellame
Institute for Photonics and Nanotechnologies - National Research Council (CNR) (IT)

Single cell analysis in monolithic optofluidic devices

We present a new class of integrated optical devices, fabricated by femtosecond laser micromachining, that allows for mechanical probing, fluorescence detection and sorting of single cells by means of optical forces inside a microfluidic chip. [1569716179]

09:30

Luke Lee
University of California at Berkeley (US)

Optofluidics by BIOPEOTS

WEDNESDAY, 15 MAY (continued)

10:30

Ian White
University of Maryland (US)

Fluidic paper SERS devices for chemical and biological analytics

We have developed inkjet-printed paper-based sensors utilizing surface enhanced Raman spectroscopy. These devices are optimal for use in low resource setting, as they are much lower in cost than current solutions. Furthermore, fluidic paper provides ease-of-use and signal-boosting lateral-flow concentration capabilities. [1569714749]

14:00

Andrew deMello
Institute for Chemical and Bioengineering (CH)

Optical detection in microfluidics: From the big to the small

My talk will decsribe two broad approaches for performing high sensitivity optical detection within microfluidic environments. First, we describe recent work in which fluorescence lifetime imaging has been shown to be a sensitive probe of environmental parameters such as pH, viscosity, molecular concentration and temperature. Additionally, we demonstrate how dynamic fluorescence lifetime imaging can be used to probe mixing dynamics in segmented-flow microfluidic systems. Moreover, I will describe how the integration of semiconducting polymer light emitting diodes and polymer photodetectors with microfluidic systems can define novel formats for quantitative point-of-care diagnostics. [1569727579]

16:00

Arnan Mitchell
RMIT University (AU)

Liquid Metal Marbles: A new Platform for Optofluidics

Liquid metal marbles are new material platforms that are formed from a liquid metal droplet, encased in a nano-material powder coating. They have many unique characteristics, sharing properties of both liquids and solids. The liquid metal droplet can be coated with functional oxides and even semiconducting powders. Surface tension forms the droplets into spheres. The powder coating is in intimate electronic contact with the liquid metal interior and acts as the only electrical conduit to the surrounding environment allowing very large fields to be concentrated on the nanoparticle coatings leading to enhanced material functionality. This presentation will introduce this new platform and talk in particular about the recent results and the prospects for applications in the field of optics, illustration how this new platform provides a bridge between mechanics, electro-chemistry and electro-magnetics. [1569716807]

MONDAY, 13 MAY		Room:
09:30-10:00	**Official Congress Opening**	1, ICM
10:00-10:45	**Opening Plenary Talk** S. Hell, (Department of NanoBiophotonics - Max-Planck-Gesellschaft, DE)	
10:55-11:00	**EOSOF 2013 - Conference Opening by the General Chairs**	22, ICM (2nd Floor)
11:00-12:30	**Optofluidics 1 - Biomaterial Photonics and Lasers** **KEYNOTE TALK: Biomaterial Photonics** A. Yun (Harvard Medical School, US)	22, ICM (2nd Floor)
12:30-14:30	Lunch break	
14:30-16:00	**Optofluidics 2 - Analysis and Waveguides** **INVITED TALK: Optofluidic platform for particle analysis and manipulation** H. Schmidt (UC Santa Cruz, US)	22, ICM (2nd Floor)
16:00-16:30	Coffee break	
16:30-18:00	**Optofluidics 3 - Transmission Optics and Droplets** **INVITED TALK: Optofluidic Transmission Optics** A.Q. Liu (Nanyang Technological University, SG)	22, ICM (2nd Floor)
18:00	**"Get Together" Trade Fair and Congress**	tba.
TUESDAY, 14 MAY		
08:15-10:00	**Optofluidics 4 - Trapping and Sensing** **INVITED TALK: Optofluidics with Nanoapertures in Metal Films** R. Gordon (University of Victoria, CA)	22, ICM (2nd Foor)
10:00-10:30	Coffee break	
10:30-12:00	**Optofluidics 5 - Energy** **INVITED TALK: Algal biotechnology and photobioreactor design** C. Howe (University of Cambridge, GB); S. Scott (University of Cambridge, GB)	22, ICM (2nd Foor)
12:00-14:00	Lunch break	
14:00-15:30	**Optofluidics 6 - Session with invited Optofluidics Industry Talks**	22, ICM (2nd Floor)
15:30-16:00	Coffee break	
16:00-16:30	**Oral Introduction by Poster Presenters**	22, ICM (2nd Floor)
16:30-18:00	**Poster Session**	Room B0, Exhib. Hall B0
WEDNESDAY, 15 MAY		
08:30-10:00	**Optofluidics 7 - Cells, Optics and flow** **INVITED TALK: Single cell analysis in monolithic optofluidic devices** R. Osellame (Institute for Photonics and Nanotechnologies - National Research Council (CNR), IT) **INVITED TALK: Optofluidics by BIOPEOTS** L. Lee (University of California at Berkeley, US)	22, ICM (2nd Floor)
10:00-10:30	Coffee break	
10:30-12:00	**Optofluidics 8 - SERS, Plasmonics and Optofluidics** **INVITED TALK: Fluidic paper SERS devices for chemical and biological analytics** I. White (University of Maryland, US)	22, ICM (2nd Floor)
12:00-14:00	Lunch break	
14:00-15:30	**Optofluidics 9 - Optical Detection, Fibers and Displays** **INVITED TALK: Optical detection in microfluidics: From the big to the small** A. deMello (Institute for Chemical and Bioengineering, CH)	22, ICM (2nd Floor)
15:30-16:00	Coffee break	
16:00-17:45	**Optofluidics 10 - Liquids and Particles** **INVITED TALK: Liquid Metal Marbles: A new Platform for Optofluidics** A. Mitchell (RMIT University, AU)	22, ICM (2nd Floor)
17:45	**Student Award Ceremony**	22, ICM (2nd Floor)
	End of EOSOF 2013	

Room 22, ICM, 2nd Floor

10:55-11:00 **OPENING BY THE GENERAL CHAIR**

David Sinton
University of Toronto (CA)

11:00-12:30 **OPTOFLUIDICS 1 - BIOMATERIAL PHOTONICS AND LASERS**

Chair: D. Sinton, University of Toronto (CA)

11:00-11:30 **KEYNOTE TALK**

Biomaterial Photonics

A. Yun (Harvard Medical School, US).

Light is clearly an attractive form of energy from medical application perspectives. However, a common problem in photomedicine is the difficulty to deliver light efficiently into tissues in vivo. Here, we discuss two forward looking approaches based on biological light sources and optical waveguides made of biopolymers. [1569729723]

11:30-11:45

Single-mode biological distributed feedback lasers based on vitamin B2 doped gelatin

C. Vannahme (Technical University of DK (DTU), DK); F. Maier-Flaig (Karlsruhe Institute of Technology (KIT), DE); U. Lemmer (Karlsruhe Institute of Technology (KIT), DE); A. Kristensen (Technical University of Denmark - DTU Nanotech, DK).

Biological second-order distributed feedback (DFB) lasers are presented. Riboflavin (vitamin B2) doped gelatin as active material is spin-coated onto nanoimprinted polymer with low refractive index. DFB grating periods of 368 nm and 384 nm yield laser emission at 543 nm and 562 nm, respectively. [1569714711]

11:45-12:00 **STUDENT PRESENTATION**

Diffusion operated optofluidic dye lasers integrated into polymer chips

T. Wienhold (Karlsruhe Institute of Technology (KIT), DE); F.x Breithaupt (Robert Bosch GmbH, DE); C. Vannahme (Technical University of DK (DTU), DK); M. Christiansen (Technical University of DK (DTU), DK); W. Dörfler (Karlsruhe Institute of Technology (KIT), DE); A. Kristensen (Technical University of DK - DTU Nanotech, DK); T. Mappes (Carl Zeiss AG, DE).

We present optofluidic DFB dye lasers on polymer chips that are operated for more than 10 000 pulses without fluidic pumping. Bleached dye is exchanged solely by diffusion in fluidic reservoirs. Polymeric chips fabricated by multiscale replication show output pulse energies above 10 µJ and spectral tunability over 24 nm. [1569711777]

12:00-12:15 **STUDENT PRESENTATION**

Active control of the emission of an optofluidic random laser

P. Sebbah (CNRS, FR); N. Bachelard (Institut Langevin, FR); S. Gigan (ESPCI, FR); X. Noblin (CNRS, FR); S. Bhaktha (IIT Kharagpur, IN).

We present an innovative mirrorless microfluidic laser where the optical cavity has been replaced by a random scattering structure. Random lasing is observed with threshold comparable to conventional optofluidic lasers. However the spectrum is by essence random and unpredictable. We demonstrate that control can be regained on this laser and singlemode operation achieved at any desired wavelength using an iterative optimization method to shape the spatial profile of the optical pump. [1569717141]

12:15-12:30 **STUDENT PRESENTATION**

Lab on a Chip imaging and quantitative microscopy in turbid microfluidic channels by Digital Holography

M. Paturzo (CNR-Istituto Nazionale di Ottica, IT); V. Bianco (CNR-Istituto Nazionale di Ottica Applicata, IT); A. Finizio (CNR-Istituto Nazionale di Ottica Applicata, IT); P. Memmolo (Università di Napoli Federico II, IT); D. Balduzzi (Istituto Sperimentale Spallanzani, IT); A. Galli (Istituto Sperimentale Spallanzani, IT); R. Puglisi (Istituto Sperimentale Spallanzani, IT); P. Ferraro (Istituto Nazionale di Ottica Applicata c/o Istituto di Cibernetica CNR, IT).

We show that clear amplitude imaging and quantitative phase contrast mapping is achievable in turbid microfluidics at Lab on a Chip scale by Digital Holography. The Doppler effect is the key to discard the contribution of the turbid medium. [1569714205]

12:30-14:30 Lunch break

NOTES

Room 22, ICM, 2nd Floor

14:30-16:00 OPTOFLUIDICS 2 - ANALYSIS AND WAVEGUIDES

Chair: T. Mappes, Carl Zeiss AG (DE)

NOTES

14:30-15:00 **INVITED TALK**

Optofluidic platform for particle analysis and manipulation

H. Schmidt (UC Santa Cruz, US).

I will discuss the principles of an optofluidic platform based on liquid-core antiresonant reflecting optical (ARROW) waveguides for particle analysis and manipulation. Applications, in particular amplification-free detection of pathogenic nucleic acids will be considered. [1569715483]

15:00-15:15

Hybrid silicon-polymer optofluidic chip with integrated solid core waveguides

G. Testa (CNR IREA, IT); G. Persichetti (CNR IREA, IT); R. Bernini (IREA-CNR, IT).

An hybrid silicon-polydimethylsiloxane (PDMS) liquid core antiresonant reflecting optical waveguide (ARROW) optofluidic platform with integrated and self-aligned solid core hybrid waveguides is reported. Preliminary experimental results on fluorescence measurements are given. [1569717065]

15:15-15:30

Liquid Crystal Optofluidics

A. Vasdekis (Pacific Northwest National Laboratories - Enviromental Molecular Sciences Laboratory, US); J. Cuennet (Ecole Polytechnique Federale de Lasusanne, CH); L. De Sio (University of Calabria, IT); D. Psaltis (Ecole Polytechnique Fédérale de Lausanne, DE).

We summarize our recent efforts in developing reconfigurable optofluidic devices via the injection of liquid crystals in micro-channels. The examples we will focus on are rapid optical modulators, compact spectrometers, as well as beam steering devices. [1569715013]

15:30-15:45

Spontaneous formation of free-standing optofluidic waveguides on patterned superhydrophobic surfaces

A. Jonas (Koc University, TR); A. Kiraz (Koc University, TR); S. Akturk (Istanbul Technical University, TR); T. Ersoy (Istanbul Technical University, TR); B. Yalizay (Istanbul Technical University, TR).

We introduce free-standing optofluidic waveguides based on ethylene glycol filaments that form spontaneously on superhydrophobic magnesium fluoride substrates with patterned surface wettability. We characterize the dynamics of the liquid waveguide formation and measure its typical propagation losses. [1569714685]

15:45-16:00 **STUDENT PRESENTATION**

An ALD-coated polymer slot waveguide for biosensor applications

L. Ahmadi (University of Eastern Finland, FI); P. Stenberg (University of Eastern Finland, FI); T. Itkonen (University of Eastern Finland, FI); J. Tervo (University of Eastern Finland, FI); M. Kuittinen (University of Eastern Finland, FI); S. Honkanen (Micronova, FI).

A polymer slot waveguide sensor configuration with thin layers of ALD-deposited Al2O3 and TiO2 materials was studied in this work. The simulation results showed that the confinement factor of light increases to 27% and the waveguide homogeneous sensitivity improved by about a factor of 4 in compare to the simple polymeric structure. Besides, water absorption problem in the aqueous polymer waveguides can be improved, significantly. [1569714819]

16:00-16:30 Coffee break

Room 22, ICM, 2nd Floor

16:30-18:00 **OPTOFLUIDICS 3 - TRANSMISSION OPTICS AND DROPLETS**

Chair: A. Vasdekis, Pacific Northwest National Laboratories (US)

NOTES

16:30-17:00 **INVITED TALK**

Optofluidic Transmission Optics

A.Q. Liu (Nanyang Technological University, SG).

In this paper, the state-of-the-art of optofluidic research is reviewed, including breakthrough innovations in optical and photonic devices, the high potential applications of optofluidics in biophysical, biochemistry and biomedical studies. [1569721655]

17:00-17:15

Pyro-EHD dispensing of micro-droplets by photothermal activation of nanocomposite films

M. de Angelis (Istituto di Fisica Applicata - CNR, IT); F. Ratto (Istituto di Fisica Applicata - CNR, IT); P. Matteini (Istituto di Fisica Applicata - CNR, IT); R. Pini (Istituto di Fisica Applicata - CNR, IT); S. Coppola (Istituto Nazionale di Ottica - CNR, IT); S. Grilli (Istituto di Ottica - CNR, IT); V. Vespini (Istituto Nazionale di Ottica - CNR, IT); P. Ferraro (Istituto Nazionale di Ottica Applicata c/o Istituto di Cibernetica CNR, IT).

We present a device for dispensing micro-droplets based on the illumination of a lithium niobate (LN) substrate with near-infrared laser light for the activation of a pyroelectric effect. Gold nanorods (GNR) are included into polyvinyl alcohol films which are placed in close contact with the lithium niobate wafer. GNR are excited with a diode laser at 810 nm to activate efficient photothermal conversion. In this way such a GNR on-LN (GNR-LN) device can be activated by NIR light to provide a cascade of photothermal and pyroelectric conversions. By scanning the laser beam over the GNR-LN device, local pyroelectric forces from the LN crystal are able to extract liquid droplets from a reservoir which is placed below the substrate. The main advantage of this approach consists in the absence of electrodes and nozzles because the liquid is directly drawn from a reservoir in an all-optical device. [1569714183]

17:15-17:30 **STUDENT PRESENTATION**

Photophoretic trampoline - A manipulation method for absorbing airborne droplets

M. Esseling (University of Muenster, DE); P. Rose (University of Muenster, DE); C. Alpmann (University of Muenster, DE); C. Denz (Institute of Applied Physics, University of Münster, DE).

Photophoretic forces are exploited to manipulate absorbing airborne droplets. We used test droplets from a specially prepared inkjet cartridge to demonstrate the transfer of photophoretic manipulation techniques from solids to liquids and estimate the necessary intensity peak intensity for an efficient interaction. [1569714707]

17:30-17:45

Laser-free and portable light-driven microfluidics: dividing, merging and mixing continuous flows or discrete droplets using LED illumination

A. Venancio-Marques (Departement of Chemistry, Ecole Normale Supérieure Paris, FR); D. Baigl (Ecole Normale Superieure, FR).

We describe the laser-free photo-actuation of various microfluidic operations (droplet generation, microfluidic mixing, and organic synthesis in optically fused droplets) using a portable LED device as a light source. Our approach relies on the photo-isomerization of surfactant molecules to modulate interfacial energy by light. [1569714729]

17:45-18:00 **STUDENT PRESENTATION**

UV-Nanoimprint Lithography in KMPR with high dimensional accuracy for optofluidic devices

C. Prokop (University of Applied Sciences Karlsruhe, DE); P. Gutruf (University of Applied Sciences Karlsruhe, DE); E. Zeller (RMIT University, AU); C. Karnutsch (University of Applied Sciences Karlsruhe, DE); A. Mitchell (RMIT University, AU).

We report on results of fabrication and characterization of sub-μm structures imprinted into KMPR, a high contrast epoxy based negative photoresist with unique optical capabilities, for optofluidic devices by using UV-nanoimprint lithography. [1569716517]

18:00 **"GET TOGETHER" Trade Fair and Congress** Room tba.

Open to all attendees of the World of Photonics Congress 2013.

Room 22, ICM, 2nd Floor

08:15-10:00 OPTOFLUIDICS 4 - TRAPPING AND SENSING

Chair: T. Mappes, Carl Zeiss AG (DE)

NOTES

08:15-08:30
Tomographic Microfluidic Microscopy
N. Pégard (Princeton University, US); J. Fleischer (Princeton University, US).
We have developed a tomographic microfluidic microscope. We combine the 1D motion of a flowing object with a 2D microscope to record multiple views of the object. The corresponding projections are then reassembled into a 3D image of the sample. Marker-free images are given for live, freely swimming C. Elegans. [1569714817]

08:30-08:45 STUDENT PRESENTATION
Nanocolloid motion control by optical nanobeam cavities
C. Renaut (CEA Grenoble, FR); B. Cluzel (Groupe d'Optique de Champ Proche, Université de Bourgogne, FR); J. Dellinger (Groupe d'Optique de Champ Proche, Université de Bourgogne, FR); L. Lalouat (Groupe d'Optique de Champ Proche, Université de Bourgogne, FR); C. Pin (Groupe d'Optique de Champ Proche, Université de Bourgogne, FR); E. Picard (CEA Grenoble, FR); D. Peyrade (CNRS/UJF-Grenoble1/CEA LTM, FR); E. Hadji (CEA Grenoble, FR); F. de Fornel (Groupe d'Optique de Champ Proche, Université de Bourgogne, FR).
We report here on chip optical trapping of micrometer-sized dielectric particles. We also show particles handling by wavelength induced field map tuning over a set of coupled nanobeam cavities. [1569713971]

08:45-09:00 STUDENT PRESENTATION
Miniaturized sorting by optical lattices based on integrated vertical-cavity laser diodes
A. Bergmann (Ulm University, DE); J. Martos Calahorro (Ulm University, DE); A. Hein (Ulm University, DE); D. Wahl (Ulm University, DE); R. Michalzik (Ulm University, DE).
We present the fabrication and operation of a miniaturized microparticle sorting device. Rows of optical traps are generated by custom-designed vertical-cavity laser diodes which are directly integrated with the microfluidic chip for maximum compactness. A fabricated prototype is shown as well as first experimental results. [1569714187]

09:00-09:15
Optoelectrokinetic trapping of Gold Nanoparticles
A. Mishra (Purdue University - West Lafayette, US); R. Thakur (Purdue University - West Lafayette, US); S. Williams (University of Louisville, US); A. Kumar (University of Alberta, CA); S. Wereley (Purdue University - West Lafayette, US).
In this work we present an infrared laser activated rapid electrokinetic method for accumulation and manipulation of 40 nm gold nanoparticles on an ITO electrode surface. [1569717107]

09:15-09:30
Optical waveguide loop with a gap for planar transport and stable trapping of cells and particles
B. Ahluwalia (University of Tromsø, NO); P. Løvhaugen (University of Tromsøø, NO); O.G. Hellesø (University of Tromsø, NO).
An optical waveguide loop with an intentional gap at the centre is employed for planar transport and stable trapping of spheres and cells. The waveguide acts as a conveyor belt, while the counter-propagating and diverging light in the gap holds the cells at a fixed position. The proposed waveguide design is numerically studied and experimentally implemented. Trapping with a waveguide gap is also combined with Raman spectroscopy. [1569714069]

09:30-10:00 INVITED TALK
Optofluidics with Nanoapertures in Metal Films
R. Gordon (University of Victoria, CA).
This talk will review recent advances in: nanohole surface plasmon resonance sensing allowing for 10E-7 refractive index unit resolution, and double nanohole optical trapping allowing for the interaction of single proteins with antibodies. [1569715627]

10:00-10:30 Coffee break

Room 22, ICM, 2nd Floor

10:30-12:00 **OPTOFLUIDICS 5 - ENERGY**

Chair: R. Bernini, IREA-CNR (IT)

NOTES

10:30-11:00 **INVITED TALK**

Algal biotechnology and photobioreactor design

C. Howe (University of Cambridge, GB); S. Scott (University of Cambridge, GB).

Criteria influencing the design of photobioreactors for algal biotechnology are discussed. The biology of the organisms involved, and the uses to which they will be put, will influence the most appropriate design of photobioreactor, so a multidisciplinary approach, including life cycle analysis, is essential. [1569716645]

11:00-11:15 **STUDENT PRESENTATION**

Plasmonics for the Cultivation of Photosynthetic Biofilms

M. Ooms (University of Toronto, CA); D. Sinton (University of Toronto, CA).

In this work, Au nano-particles are used as plasmonic scattering elements to direct and confine light to photosynthetic biofilms grown on glass surfaces. Targeted confinement of light within biofilms is critical for developing high density optofluidic photobioreactors to produce biofuels and high value compounds. [1569714801]

11:15-11:30

High density photobiorefineries with optimized light delivery

E. (Erica) Jung (Cornell University, US); M. Kalontarov (Cornell University, US); D. Doud (Cornell University, US); L. Angenent (Cornell University, US); D. Erickson (Cornell University, US).

We demonstrate a new form of stackable photobioreactor that improves the light distribution while being compatible with fuel secreting organisms. Our approach is based on light delivery to surface bound photosynthetic organisms via the evanescent field of an optically excited slab waveguide. We experimentally demonstrated the stackable photobioreactor that utilizes the evanescent field to grow photosynthetic organisms. The new photobioreactors will allow 450 fold enhancement in the volumetric productivity of algae biofuel production. [1569717037]

11:30-11:45 **STUDENT PRESENTATION**

A photosynthetic-plasmonic-voltaic cell (PPV): Excitation of photosynthetic bacteria and current collection through a plasmonic substrate

N. Samsonoff (University of Toronto, CA); D. Sinton (University of Toronto, CA).

In this work, we demonstrate photosynthetic excitation of biofilms and electric current collection with a plasmonic substrate. This two-fold use of the plasmonic substrate helps address light delivery issues due to densification of photosynthetic cultures, allowing cogeneration of electricity and biofuel in an optofluidic photobioreactor. [1569712499]

11:45-12:00

A Visible to Near Infrared Optofluidic Device Based on Functionalized Plasmonic Nanoparticle Dense Films

A. Steinbrück (Friedrich-Schiller-University, DE); J. Richter (Friedrich-Schiller-University, DE); J.-W. Choi (Ecole Polytechnique Federale de Lausanne, CH); T. Pertsch (Friedrich-Schiller-University, DE); A. Tünnermann (Fraunhofer-Institut für Angewandte Optik und Feinmechanik IOF, Jena, DE); R. Grange (Friedrich-Schiller-University, DE).

We present an optofluidic chip that utilizes functionalized dense plasmonic nanoparticle films with resonances from visible to infrared wavelength as converters of laser light into heat- or potential light-induced chemical reactions. [1569714699]

12:00-14:00 Lunch break

Room 22, ICM, 2nd Floor

14:00-15:30 **OPTOFLUIDICS 6 - SESSION WTIH INVITED OPTOFLUIDICS INDUSTRY TALKS**

Chair: P. Ferraro, Istituto Nazionale di Ottica Applicata (IT)

14:00-14:15 **INVITED TALK**

Optofluidics Inc. - Forming a Start-up Company from Optofluidic Technology

D. Erickson, Cornell University (US).

In this talk, I will discuss some of the challenges around forming a successful start-up company based on university developed optofluidic technology. Topics that I will cover include: understanding the difference between a research project and a business opportunity, licensing, attracting early stage funding, manufacturing, product launches, importance of generating early revenue, developing partnerships, and exit strategies. [1569717017]

14:15-14:30 **INVITED TALK**

Festo Inc. - Pneumatic OptoFluidics

D. Rabus, Festo AG & Co. KG (DE).

14:30-14:45 **INVITED TALK**

LioniX Inc. - TriPleX-based optofluidic technology for lab-on-a-chip applications

A. Leinse, LioniX (NL).

14:45-15:00

Microfluidics and Optofluidics Prototyping Based on Directed Polymer Dissolution

A. Vasdekis (Pacific Northwest National Laboratories, US).

We will present our recent results in developing a new polymer imprinting technique based on directed polymer dissolution, tailored for microfluidic, and optofluidics reactors. The technique enables both the imprinting and bonding of thermoplastic polymers in very short time-scales; typically, complete assembly can be achieved in less than one minute. This represents a significant improvement over conventional thermal imprinting techniques, as well more recently developed injection techniques.

15:00-15:15

Biology and Molecular Evolution: Optothermal actuation of fluids and molecules

D. Braun (LMU Munich, DE).

The movement of proteins in an optically created temperature gradient is a sensitive and versatile way to probe protein interactions, including the important class of membrane receptors binding to its target molecule. The binding was detected all-optically in various biological fluids and commercializes by our Startup Nanotemper. The movement can be understood with a capacitor model of ionic shielding.
Optothermal fields not only move molecules. A spatially moving warm spot moves water all-optically along arbitrary paths, opening the possibility of light driven microfluidics. Thermal expansion in a viscosity gradient explains this nonlinear effect. Combined with the thermal control of molecules, various molecule traps can be implemented.
We managed to measure the reaction speed inside living cells using optically applied fast temperature oscillations and a molecular lock-in method. Thermal molecule traps occur naturally in hydrothermal pores of rock. They offer a compelling disequilibrium system to drive molecular evolution. [1569712153]

15:15-15:30

Integration of microfluidics and Quantitative Phase Microscopy for physical Characterization of microscopic objects

N. Cardenas (University of Texas at Arlington, US); S. Mohanty (University of Texas at Arlington, US).

Microfluidics has emerged as a powerful tool for fast, precise environmental control in the micro/nano-scales. Changes in physical properties of microscale objects require non-invasive characterization with high spatio-temporal resolution. Here we integrate quantitative phase microscopy and microfluidics for in-situ characterization. [1569717201]

15:30-16:00 Coffee break

16:00-16:30 Oral Introduction by Poster Presenters — 22, ICM (2nd Floor)
16:30-18:00 **POSTER SESSION** — Room B0, Exhib. Hall B0, Ground Floor

NOTES

Room 22, ICM, 2nd Floor

08:30-10:00 OPTOFLUIDICS 7 - CELLS, OPTICS AND FLOW

Chair: T. Mappes, Carl Zeiss AG (DE)

NOTES

08:30-08:45
Towards Doppler-Based Flow Measurements in Microfluidics Channels
L. Stern (Hebrew University of Jerusalem, IL); M. Tzur (Hebrew University of Jerusalem, IL); M. Veinguer (Hebrew University of Jerusalem, IL); A. Bakal (Hebrew University of Jerusalem, IL); N. Mazurski (Hebrew University of Jerusalem, IL); U. Levy (The Hebrew University of Jerusalem, IL).
We demonstrate the construction of an optofluidic device for measuring the flow rate in microfluidic channels, combining a periodic bubble-oil microfluidic structure with the Doppler effect. The constructed device will provide accurate flow measurements in advanced "lab on a chip" systems, such as flow cytometry, particle counting and sorting. [1569717101]

08:45-09:00 STUDENT PRESENTATION
Dynamic microfluidic mixing triggered by an external LED illumination
A. Venancio-Marques (Departement of Chemistry, Ecole Normale Supérieure Paris, FR); D. Baigl (Ecole Normale Superieure, FR).
We describe a dynamic control of microfluidic mixing triggered by light, a much-needed operation for future all-optofluidic chips. Here, light provided by an external LED illumination device induces the generation of water microdroplets that act as reversible stirrers of two continuous oil phase flows containing samples to be mixed. [1569714743]

09:00-09:30 INVITED TALK
Single cell analysis in monolithic optofluidic devices
R. Osellame (Institute for Photonics and Nanotechnologies - National Research Council (CNR), IT).
We present a new class of integrated optical devices, fabricated by femtosecond laser micromachining, that allows for mechanical probing, fluorescence detection and sorting of single cells by means of optical forces inside a microfluidic chip. [1569716179]

09:30-10:00 INVITED TALK
Optofluidics by BIOPEOTS
L. Lee (University of California at Berkeley, US).

10:00-10:30 Coffee break

10:30-12:00 OPTOFLUIDICS 8 - SERS, PLASMONICS AND OPTOFLUIDICS

Chair: U. Levy, The Hebrew University of Jerusalem (IL)

10:30-11:00 INVITED TALK
Fluidic paper SERS devices for chemical and biological analytics
I. White (University of Maryland, US); W. Yu (University of Maryland, US); E. Hoppmann (University of Maryland, US); S. Yazdi (University of Maryland, US).
We have developed inkjet-printed paper-based sensors utilizing surface enhanced Raman spectroscopy. These devices are optimal for use in low resource setting, as they are much lower in cost than current solutions. Furthermore, fluidic paper provides ease-of-use and signal-boosting lateral-flow concentration capabilities. [1569714749]

Room 22, ICM, 2nd Floor

11:00-11:15
Utilization of passive microfluidic mixing for the enhancement of SPR biosensors
N. Lynn, Jr. (Institute of Photonics and Electronics, CZ); H. Šípová (Institute of Photonics and Electronics, CZ); P. Adam (Institute of Photonics and Electronics, CZ); J. Homola (Institute of Photonics and Electronics, CZ).
Here we utilize computational and experimental methods to study the utilization of a staggered herringbone mixer (SHM) on the enhancement of a surface plasmon resonance (SPR) biosensor. We show that the use of the SHM can have either beneficial or detrimental effects, depending on the value of the Péclet number. [1569714715]

11:15-11:30
Microfluidic dark field detection of aggregating plasmonic nanoparticles
M. Loumaigne (ENS Cachan Antenne Bretagne, FR).
Here we demonstrate the feasibility of detecting aggregates of plasmonic particles in microchannels using resonant light scattering. The optical setup is based on a dark-field type illumination using the transparent microfluidic device as a waveguide and an array of light-emitting diodes (LEDs) as light source. [1569714775]

11:30-11:45
A microfluidic sensing system based on a synthetic receptor material with label-free holographic detection for bioanalysis
S. Kunath (Compiègne University of Technology, FR); Y. Fuchs (Compiègne University of Technology, FR); O. Soppera (Mulhouse Institute of Material Sciences, FR); K.-H. Feller (Fachhochschule Jena, DE); A. Mayes (University of East Anglia, FR); K. Haupt (Compiègne University of Technology, FR).
Label-free optofluidic biosensors are very attractive for several applications, e.g. for biomedical, environmental and food analysis, as they do not require labeling and are adaptable to many different targets. We describe here the development of a microfluidic sensing system based on molecularly imprinted polymers (MIPs) as recognition elements, which are structured as holograms (Bragg reflection gratings) for label-free optical transduction. MIPs are synthetic receptors that can be tailored to recognize and bind a variety of targets. The holographic films do not only reflect light but are also capable of binding steroid molecules, the target of the MIP, specifically. The binding process induces changes in the polymeric matrix structure such that the film changes its optical properties (wavelength shift) as the sensor response. The MIP-holograms are deposited on a microfluidic chip that allows for automated sample handling and multiplexed optical detection for multiple MIPs specific for a variety of target analyts. [1569717083]

11:45-12:00
Waveguide arrays for light harvesting in optofluidic chips fabricated by femtosecond laser micromachining
S.S. Kumar Guduru (Istituto Italiano di Tecnologia, IT).
We demonstrate a novel way of harvesting light viz. fluorescence from optofluidic microchannels fabricated by femtosecond laser micromachining filled with organic materials. The architecture consists of waveguide bunches in the vicinity of the micro channels filled with oragnic materials for light collection and further manipulation. [1569716741]

12:00-14:00 Lunch break

14:00-15:30 **OPTOFLUIDICS 9 - OPTICAL DETECTION, FIBERS AND DISPLAYS**

Chair: C. Karnutsch, University of Applied Sciences Karlsruhe (DE)

14:00-14:30 **INVITED TALK**
Optical detection in microfluidics: From the big to the small
A. deMello (Institute for Chemical and Bioengineering, CH).
My talk will decsribe two broad approaches for performing high sensitivity optical detection within microfluidic environments. First, we describe recent work in which fluorescence lifetime imaging has been shown to be a sensitive probe of environmental parameters such as pH, viscosity, molecular concentration and temperature. Additionally, we demonstrate how dynamic fluorescence lifetime imaging can be used to probe mixing dynamics in segmented-flow microfluidic systems. Moreover, I will describe how the integration of semiconducting polymer light emitting diodes and polymer photodetectors with microfluidic systems can define novel formats for quantitative point-of-care diagnostics. [1569727579]

NOTES

Room 22, ICM, 2nd Floor

14:30-14:45
Photonic devices based on anisotropic fluids
Vincenzo Caligiuri (Univ. of Calabria and CNR-IPCF - LICRYL, IT); L. De Sio (Univ. of Calabria, IT).
We report our recent efforts devoted to the realization and characterization of a new generation of optofluidic devices based on soft-elastomeric microstructures combined with reconfigurable anisotropic fluids. In our opinion, this approach represents a breakthrough towards "active optofluidics". [1569713485]

14:45-15:00 STUDENT PRESENTATION
Long-period Grating based Optical Fiber Sensing for CO_2 Transportation and Sequestration
B. Bao (University of Toronto, CA); D. Sinton (University of Toronto, CA).
Long-period grating based optical fiber sensors are developed to 1) detect supercritical CO_2 in brine for carbon sequestration, and 2) measure water dew-point (condensation) in air and CO_2 streams. The sensitivity of long-period grating to local refractive index of surrounding medium is used as the basis of the measurement. The preliminary result indicates that the long-period grating optical fiber sensor can detect condensed water from air flow. [1569716709]

15:00-15:15 STUDENT PRESENTATION
A fluorescence fiber optic sensor based on photostructured molecularly imprinted polymers and microfluidics
X.-A. Ton (Compiegne University of Technology, FR); B. Tse Sum Bui (Compiègne University of Technology, FR); M. Resmini (Queen Mary University of London, GB); P. Bonomi (Queen Mary University of London, GB); S. Kunath (Compiègne University of Technology, FR); O. Soppera (Mulhouse Institute of Material Sciences, FR); K. Haupt (Compiègne University of Technology, FR).
We describe here a highly selective fiber optic sensor carrying in-situ polymerized molecularly imprinted microstructures as the recognition element, which is based on fluorescence for detection by using a fluorescent signaling monomer. The sensor was coupled to a miniaturized microfluidic system for monitoring. [1569717081]

15:15-15:30
Liquid Lens-based Smart Scanning Laser Projection Display
N. Riza (University College Cork, IE); M. Junaid Amin (University College Cork, IE).
A smart Laser Scanning Display (LSD) design is presented using a liquid-based Electronically Controlled Variable Focal Length Lens (ECVFL) to achieve the highest pixel resolution possible at multiple screen distances. A proof-of-concept experiment is conducted for screen distances reaching 8 meters. [1569712747]

15:30-16:00 Coffee break

16:00-17:45 **OPTOFLUIDICS 10 - LIQUIDS AND PARTICLE**
Chair: D. Sinton, University of Toronto (CA)

16:00-16:30 INVITED TALK
Liquid Metal Marbles: A new Platform for Optofluidics
A. Mitchell (RMIT University, AU); V. Sivan (RMIT University, AU); S. Tang (RMIT University, AU); A. O'Mullane (RMIT University, AU); B. Gol (RMIT University, AU); F. Lieder (Hochschule Karlsruhe, DE); K. Kalantar-Zadeh (Royal Melbourne Institute of Technology, AU).
Liquid metal marbles are new material platforms that are formed from a liquid metal droplet, encased in a nano-material powder coating. They have many unique characteristics, sharing properties of both liquids and solids. The liquid metal droplet can be coated with functional oxides and even semiconducting powders. Surface tension forms the droplets into spheres. The powder coating is in intimate electronic contact with the liquid metal interior and acts as the only electrical conduit to the surrounding environment allowing very large fields to be concentrated on the nanoparticle coatings leading to enhanced material functionality. This presentation will introduce this new platform and talk in particular about the recent results and the prospects for applications in the field of optics, illustration how this new platform provides a bridge between mechanics, electro-chemistry and electro-magnetics. [1569716807]

NOTES

Room 22, ICM, 2nd Floor

16:30-16:45
Fabrication and characterization of an electrowetting display in a cubic structure
M. Riahi (Kavosh Laser Co. Ltd., IR); K. Brakke (Susquehanna University, US); E. Alizadeh (Kavosh Laser Co. Ltd., IR); A. Shoghi (Shahid Beheshti University, IR).
An array of a cubic structures containing a glass, ITO, dielectric and hydrophobic layer is fabricated and dosed with a colored oil and surrounded by saline. By applying voltage to the electrode and the saline, the colored oil is pushed away and the transparency of each cube can be switched on or off. [1569711895]

16:45-17:00 STUDENT PRESENTATION
Printed Fabrication of Microdisk at Room Temperature
T. Ota (Kyushu University, JP); H. Yoshioka (Kyushu University, JP); K. Yasui (Nissan Chemical Industries, Ltd, JP); D. Maeda (Nissan Chemical Industries, Ltd, JP); Y. Oki (Kyushu University, JP).
Novel fabrication process for polymeric microdisk was proposed and demonstrated by ink-jet technique for the first time. Extremely low viscosity of hyper-branched polymers and solubility control based on Hansen parameters were combined. They can stack thick polymeric disks and only three shots of droplet can fabricate microdisks. [1569714735]

17:00-17:15
Rapid Electrokinetic Patterning Technique for Manipulation of Colloids and Microorganisms, and its Technical Advancement
J.-S. Kwon (Purdue University, US); V. Velasco (University of Louisville, US); S. Williams (University of Louisville, US); S. Wereley (Purdue University - West Lafayette, US).
Recently a novel non-contact opto-electrokinetic technique termed rapid electrokinetic patterning (REP) was suggested by Williams et al. The technique could carry out particle manipulation in a variety of forms through the simultaneous application of a uniform AC electric field and a laser. The ability of REP intuitively is expected to make significant contributions to biochemical analysis using LOC devices. However, detailed investigations about bio-compatibility of the technique are yet to be attempted. Therefore we perform various manipulation experiments using indicator microorganisms in order to establish bio-compatibility of REP and report the results. Also, we introduce a non-optical REP technique such that it can be utilized inexpensively and particle assemblies may be performed in parallel. [1569717213]

17:15-17:30 STUDENT PRESENTATION
A solution of pre-tension membrane for improving the usability of liquid-membrane-liquid lens in its weak power area
L. Wang (University of Tokyo, JP); H. Oku (The University of Tokyo, JP); M. Ishikawa (University of Tokyo, JP).
Variable-focus lens was known in decade years, and various prototypes were published and meaningful potential applications are also expected. Liquid-filled lens is one of the approaches. A liquid-liquid lens structure with a step response time of 2ms, and a root-mean-square wavefront error of 80.3nm was reported. In addition, referencing the structure of liquid-liquid lens, a liquid-membrane-liquid structure was proposed to realize a 30mm aperture liquid lens. However, a symmetric deformed shape of membrane is still an issue when lens shifts its power between negative and positive, due to the character of elasticity. In this paper, the authors discuss an improvement fabrication procedure, which loading pretension distribution on the membrane beforehand, in order to improve the symmetric deformation in its weak power area. [1569716891]

17:30-17:45 STUDENT PRESENTATION
Numerical simulation of variable-focus liquid lenses
O. Ghazian (Western University, CA); J. Sabarinathan (University of Western Ontario, CA); K. Adamiak (University of Western Ontario, CA); G.S.P. Castle (University of Western Ontario, CA).
The work presented here is a numerical study of liquid-based variable lenses taking into account the effect of applied voltage and the contact angle of the surface. The conservation of mass and the Navier-Stokes equations for a Newtonian incompressible fluid were solved to model the fluid flow both inside and outside the droplet. The level-set method was used to describe the evolution of the lens shape and interface tracking between two immiscible fluids. The electrohydrodynamic equations have been solved using the commercial software COMSOL MULTIPHYSICS™ based on the Finite Element Method. The effect of the viscosity ratio on time response has been investigated. The simulation results demonstrate that the current numerical method may provide an effective approach to quantitatively analyze complex electrohydrodynamic problems. [1569714755]

17:45 Student Award Ceremony

End of EOSOF 2013

NOTES

POSTER SESSION

16:00-16:30 **ORAL INTRODUCTION BY POSTER PRESENTERS** **22, ICM (2ND FLOOR)**
Chair: A. Vasdekis, Pacific Northwest National Laboratories (US)

16:30-18:00 **POSTER SESSION** **ROOM B0, EXHIB. HALL B0, GROUND FLOOR**

NOTES

For the first time, EOSOF 2013 features a poster introductions session directly before the start of the official poster session. This session shall give the posters more visibility and the author the option to shortly present his/her topics to the whole meeting audience.

Posters are presented in the order given in the following.

IMPORTANT:
- Poster authors are requested to restrict themselves to a maximum of 3 minutes. Details shall only be presented in the subsequent official poster session.
- Authors must restrict themselves to only 1 slide for their poster introduction.

1569714011_001
Nanostructured glass fibres for optical trapping of nanoparticles
J.-C. Tinguely (University of Tromsø, NO); P. Brox (University of Tromsø, NO); B. Ahluwalia (University of Tromsø, NO); M. Ding (University of Southampton, GB); G. Brambilla (The Optoelectronics Research Centre (ORC), GB); A. Hohenau (University of Graz, NO); J. Krenn (University of Graz, AT); O.G. Hellesø (University of Tromsø, NO).
We introduce metal coated and nanostructured optical fibres for nanoparticle trapping. Information is provided on the probe manufacturing and design, with the distribution of the optical forces simulated with the finite element method.

1569714639_002
Measurement of temporal response characteristics of liquid-liquid interface with a pinned contact line for high-speed liquid lens design
H. Oku (The University of Tokyo, JP); K. Tsukamoto (The University of Tokyo, JP); M. Ishikawa (University of Tokyo, JP).
Temporal responses of a liquid-liquid interface with a pinned contact line were measured to investigate the relationship between lens design parameters, such as an aperture diameter and a liquid viscosity, and temporal response performance.

1569714725_003
Optofluidic coupler
D. Stadnik (Institute of Biotechnology and Antibiotics, PL); A. Dybko (Warsaw University of Technology, PL).
The paper presents a construction of a microfluidic system in which an optical coupler was developed. The chip was prepared by micromilling technology in PMMA. Planar optical fibres were designed in such a way that they created an optical coupler. The optical power ratio between the fibres changes due to the variations of the refracting index of the liquid medium pumped through the microchannel.

1569714773_004
Print-like Fabrication of Laser Systems in PDMS Flowchip
K. Kuwamitsu (Kyushu University, JP); H. Yoshioka (Kyushu University, JP); N. Naruishi (AIST, JP); Y. Tanaka (AIST, JP); Y. Oki (Kyushu University, JP).
Fully print-like fabrication for polymeric and optically pumped laser system in PDMS chip was demonstrated. The pumping planer waveguides and dye doped line waveguide were combined for intagratable laser and pumping optical system via fiber pumping. Flow channel coupling was also studied.

POSTER SESSION

1569714823_005
Counterparts of passive optical elements in optofluidics
R. Kasztelanic (University of Warsaw, PL).
We present a numerical study of constructing electromagnetic fields in such a way that it can function of passive optofluidics components similar to the lenses, prisms and waveguides.

1569716679_006
Liquid jet optofluidic waveguide for UV fluorescence spectroscopy of water samples
G. Persichetti (CNR IREA, IT); G. Testa (CNR IREA, IT); R. Bernini (IREA-CNR, IT).
An optofluidic self-aligned water jet waveguide for UV induced fluorescence spectroscopy in water samples is reported. The device allows efficient fluorescence collection with minimization of pump scattering. Preliminary experimental results confirm the possibility to detect organic compounds at low level.

1569716907_007 STUDENT PRESENTATION
Loss Engineering in Slow-Light Photonic Crystal Waveguides
C. Prokop (University of Applied Sciences Karlsruhe, DE); A. Ebnali-Heidari (Shahrekord University, Iran); M. Ebnali-Heidari (Shahrekord University, Iran); C. Karnutsch (University of Applied Sciences Karlsruhe, DE).
We propose using optofluidic techniques to produce an efficient slow-light regime in silicon photonic crystal waveguides. The proposed technique is based on selective fluid infiltration of a photonic crystal to produce low propagation loss in the slow-light regime over a substantial bandwidth.

1569738305_008 STUDENT PRESENTATION
Interaction of laser beams with microdroplets containing medicines solutions in water
I.R. Andrei (National Institute for Laser, Plasma and Radiation Physics, RO); T. Alexandru (National Institute for Laser, Plasma and Radiation Physics, RO; University of Bucharest, Faculty of Physics, RO); A. Dinache (National Institute for Laser, Plasma and Radiation Physics, RO; University of Bucharest, Faculty of Physics, RO); M. Boni (National Institute for Laser, Plasma and Radiation Physics, RO; University of Bucharest, Faculty of Physics, RO); V. Nastasa (National Institute for Laser, Plasma and Radiation Physics, RO); S. Simion (National Institute for Laser, Plasma and Radiation Physics, RO); C. Ticos (National Institute for Laser, Plasma and Radiation Physics, RO); M.L. Pascu (National Institute for Laser, Plasma and Radiation Physics, RO; University of Bucharest, Faculty of Physics, RO).
The unresonant and resonant interactions of laser beams with microdroplets in pendant position in air are described. Mechanical effects of light pressure on droplets of water and medicines solutions in water are shown. Fast modifications of molecular structure of Chlorpromazine HCl in water produced by interaction with laser beams are presented.

NOTES

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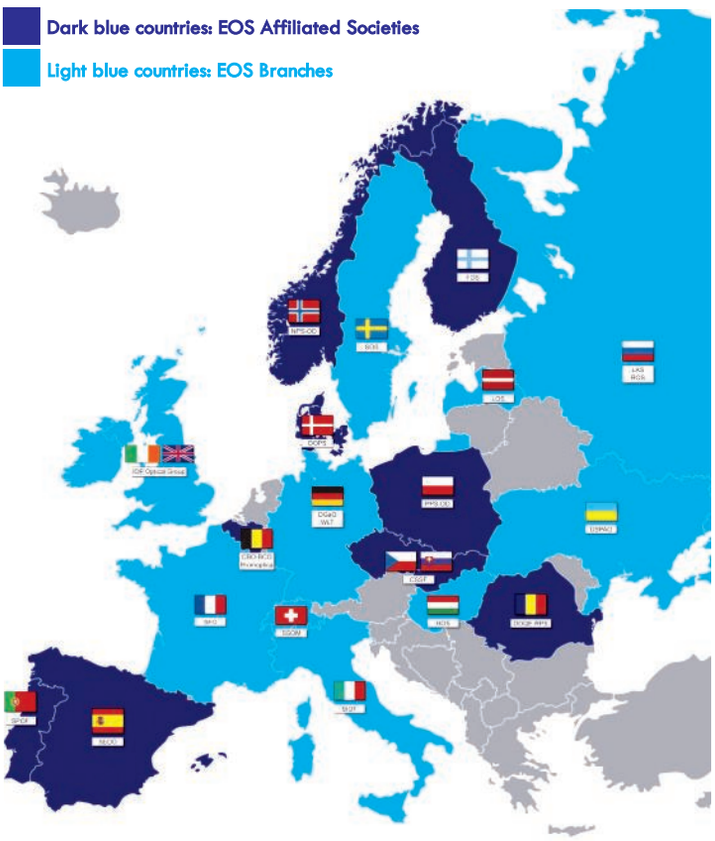

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