BGPP

Bragg Gratings
Photosensitivity and Poling in Glass Waveguides

Topical Meeting and Tabletop Exhibit

September 1-3, 2003

Embassy Suites
Monterey, California

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Peter Kazansky, *Univ. of Southampton, United Kingdom*
Valerio Pruneri, *Corning OTI, Italy*
Danny Wong, Photonics Consulting, *USA*

About BGPP

The fifth OSA Topical Meeting on Bragg Gratings, Photosensitivity and Poling will mark the 25th anniversary of the discovery of Bragg gratings and photosensitivity. Special events will be held to commemorate this breakthrough and to highlight its widespread dissemination in the Photonic world. In addition, the scope of the 2003 meeting is broadened to include linear and nonlinear effects in structured fibers and photonic bandgap materials.

Meeting Topics

Topics to be covered:

I. Grating Applications:

- Advances in fiber-grating fabrication techniques, including automation and packaging techniques
- Novel applications
- Gain flattening in optical amplifiers
- High-power, cladding-pumped fiber lasers and cascaded Raman lasers and amplifiers
- Fiber grating sensors and sensor systems
- Fiber lasers incorporating gratings, including DFB and DBR lasers
- Semiconductor lasers with Bragg gratings for stabilization or external cavity operation
- Direct UV patterning or phase trimming of integrated optical devices
- Comparative impact of grating-based technologies on optical communications systems
- Monitoring of the spectrum and polarization of communications systems with gratings

II. Grating Properties:

- Bragg gratings for Optical Add-Drop Multiplexers and other WDM filters (including cladding mode suppressed gratings)
- Bragg grating dispersion compensators
- Long period gratings for gain flattening, filtering, mode conversion, and sensors
- Gratings and devices based on radiation-mode coupling
- Modeling of optical properties of new gratings and devices

- Grating synthesis (inverse scattering)
- Limitations on optical properties of gratings, like PMD, PDL, and delay ripple
- Gratings in new geometries
- Structured fibers, including effective-medium and photonic bandgap effects

III. Fundamentals of Photosensitivity:

- Improvements in the understanding of photosensitivity in fibers and waveguides
- New glass compositions and processing methods for enhanced photosensitivity
- Gratings in new materials systems (like polymers or chalcogenide glasses)
- Modeling the kinetics of UV-induced index changes occurring during grating writing
- Basic studies of point defects responsible for photosensitivity
- Role of Hydrogen in UV-induced index change mechanism
- Role of stress and structural change in UV-induced index change mechanisms
- Thermal stability of UV-induced index changes in glasses
- Effects of high optical power levels on grating properties

IV. Nonlinear Effects and Poling:

- Devices based on nonlinear (Kerr-type) interactions in gratings
- Nonlinear effects in photonic bandgap and structured optical waveguides/fibers
- The physics and chemistry of poling
- Advances in thermal and UV-assisted poling of fibers and waveguides
- Devices based on poled glasses
- Gap solitons and related effects

Speakers

The list of plenary and invited speakers during the main program includes a session code for easy reference:

Plenary Speaker

Spinning webs for catching light, Philip St. John Russell, *University of Bath, United Kingdom.* [MA2]

Story of Bragg Gratings- From discovery to commercialization, Gerry Turcotte, *Communication Res. Ctr., Canada* [MA1]

Invited Speakers

Novel grating designs and properties, Lawrence Chen, *McGill University, Canada* [TuB1]

Generating quiet continua: Noise effects during supercontinnum generation in microstructure fibre, John Dudley, *University de Franche-Comte, France* [TuC5]

The effect of UV lasers treatment on atomic (low frequency) and electronic (high frequency) parts of dielectric susceptibility in silicate photosensitive glasses, Konstantin M. Golant, *Fiber Optics Res. Ctr., Russia* [MC1]

Manufacturing of high-channel count dispersion compensators using complex phase masks technology, Martin Guy, Yves Painchaud, et Francois Frépanier, *Teraxion, Canada* [WC1]

193nm photosensitivity in silica and local laser-induced fs heating and cooling, Peter Harrowell, *University of Sydney, Australia* [WA1]

Micro-bending induced tunable fiber gratings in single mode fiber, Henry Lee, *University of California, Irvine, USA* [WD1]

The "Glamorous" European project (GLAss-based MOdulators, ROUters and Switches), Valerio Pruneri, et al, *Corning OTI, Italy* [WB1]

Novel grating devices in few-mode fibers, Siddharth Ramachandran, *OFS Labs, USA* [TuD1]

Group delay ripple in chirped fiber Bragg gratings, Misha Sumetsky, *OFS Labs, USA* [MB1]

UV trimming of AWG devices, Kazumasa Takada, *Gunma University, Japan* [TuA1]

Publications

Advance Program

The Advance Program will be available online in early July 2003. Authors submitting papers, past meeting participants and current committee members will automatically receive an email notification when the Advance Program is available.

Technical Digests

The BGPP Technical Digest will be comprised of the camera-ready summaries of papers being presented during the meeting. At the meeting, each registrant will receive a copy of the Technical Digest. Extra copies may be purchased at the meeting for a special price of US $45.

Exhibitor List

2003 Exhibitors Include:

EXFO, Inc.
Ibsen Photonics A/S
Micron Optics, Inc.
PD-LD, Inc.
Photonics Spectra/Laurin Publishing Co., Inc.
StockerYale Inc.
TeraXion, Inc.
Weatherford International

Agenda of Sessions

Sunday, August 31, 2003

Time	Event
2:00pm - 7:00pm	Registration *Salon Foyer*

Monday, September 1, 2003

Time	Event
7:30am - 5:00pm	Registration/Speaker and Presider Check-In *Salon Foyer*
8:15am-8:30am	Opening Remarks *Salon A-C*
8:30am-10:00am	**MA:** Plenary Session *Salon A-C*
10:00am-10:30am	Coffee Break *Salon D-G*
10:00am-6:00pm	Exhibits Open
10:30am-12:00pm	**MB:** Grating Properties: I *Salon A-C*
12:00pm-1:30pm	Lunch Break
1:30pm-3:15pm	**MC:** Photosensitivity and Chemistry *Salon A-C*
3:15pm-3:45pm	Coffee Break *Salon D-G*
3:45pm-5:45	**MD:** Poster Session *Salon D-G*

Tuesday September 2, 2003

Time	Event
7:30am - 4:30pm	Registration/Speaker and Presider Check-In *Salon Foyer*
8:30am-10:00am	**TuA:** Planar Devices *Salon A-C*
10:00am-10:30am	Coffee Break *Salon D-G*
10:00am-4:00pm	Exhibits Open
10:30am-12:00pm	**TuB:** Grating Properties: II *Salon A-C*
12:00pm-1:30pm	Lunch Break
1:30pm-3:00pm	**TuC:** Nonlinear Effects and Poling Devices *Salon A-C*
3:00pm-3:30pm	Coffee Break *Salon D-G*
3:30pm-4:45pm	**TuD:** Grating Properties III *Salon D-G*
4:45pm-5:30pm	**TuE:** Postdeadline Session *Salon A-C*
5:30pm-7:00pm	Conference Reception *Salon D-G*

Wednesday September 3, 2003

Time	Event
8:00am - 4:00pm	Registration/Speaker and Presider Check-In *Salon Foyer*
8:30am-10:00am	**WA:** Photosensitivity and Structure *Salon A-C*
10:00am-10:30am	Coffee Break *Salon D-G*
10:30am-12:00pm	**WB:** Profiling of X(2) *Salon A-C*
12:00pm-1:30pm	Lunch Break
1:30pm-3:00pm	**WC:** Grating Fabrication and Characterization *Salon A-C*
3:00pm-3:30pm	Coffee Break *Salon D-G*
3:30pm-5:00pm	**WD:** Novel Devices and Applications *Salon A-C*

Bragg Gratings, Photosensitivity and Poling in Glass Waveguides

September 1-3, 2003

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■ Sunday
■ August 31, 2003

Location: Salon Foyer

2:00pm – 7:00pm
Registration

Location: Salon Foyer

2:00pm
Postdeadline Paper Deadline

■ Monday
■ September 1, 2003

Location: Salon Foyer

7:30am – 5:00pm
Registration/Speaker and Presider Check-in

Location: Salon A-C

8:15am – 8:30am
Opening Remarks

Location: Salon A-C

8:30am – 10:00am
MA ■ Plenary Session
Jacques Albert, Hull, PQ, Canada.

MA1 8:30am ◙PLENARY
Story of Bragg gratings - From discovery to commercialization, *Gerry Turcotte, Ottawa, ON, Comm. Res. Ctr., Canada.*

MA2 9:15am ◙PLENARY
Spinning webs for catching light, *Philip St. John Russell, Univ. of Bath, Bath, UK.*

Location: D-G

10:00am – 10:30am
Coffee Break

Location: Salon A-C

10:30am – 12:00pm
MB ■ Grating Properties I
Benjamin Eggleton, CUDOS, Univ. of Sydney, Sydney, NSW, Australia.

MB1 10:30am ►INVITED
Group delay ripple in chirped fiber Bragg gratings: Theory, measurement, and reduction, *Misha Sumetsky, OFS Lab., Murray Hill, NJ, USA; N. M. Litchinitser, OFS Lab., Murray Hill, NJ, USA; P. S. Westbrook, OFS Lab., Murray Hill, NJ, USA; Y. Li, Specialty Photonic Devices, OFS Lab., Murray Hill, NJ, USA.*
This paper reviews progress in the understanding, measurement, and reduction of group delay ripple in chirped fiber Bragg gratings.

MB2 11:00am
Reconstruction of the transverse index change profile of a Bragg grating from the reflected cladding mode spectrum, *Xavier Daxhelet, Ecole Polytechnique de Montreal, Montreal, PQ, Canada; Suzanne Lacroix, Ecole Polytechnique de Montreal, Montreal, PQ, Canada; Marc Verhaegen, ITF Optical Tech., Montreal, PQ, Canada.*
From the amplitude of the reflected cladding mode peaks, the coupling coefficients are found and the transverse index profile of a fiber Bragg grating is reconstructed via an expansion over the cladding mode fields.

MB3 11:15am
Iterative scheme for the "mixed" scattering problems, *Alexander V. Buryak, Bandwidth Foundry Pty. Ltd., Sydney, Australia.*
An efficient method of flexible design of one-dimensional multi-layered structures is suggested. The method can be used when desired spectral characteristics are not specified rigidly in all frequency range and there is a certain degree of freedom in formulation of the corresponding inverse scattering problem.

MB4 11:30am
Polarization diverse optical frequency domain interferometry: All coupler implementation, *Brian J. Soller, Luna Techs., Blacksburg, VA, USA; Mark E. Froggatt, Luna Techs., Blacksburg, VA, USA.*
We describe an all-coupler implementation of a polarization-diverse frequency domain reflectometer (OFDR). We measure the transfer function of an FBG by projecting a measurement field onto two orthogonal
reference fields and show that the resultant signal is independent of the alignment of the measurement field.

MB5 11:45am
High-temperature Bragg gratings in germanosilicate fibers, *Victor Grubsky, Sabeus Photonics, Chatsworth, CA, USA; Dmitry Starodubov, Sabeus Photonics, Chatsworth, CA, USA; William W. Morey, Sabeus Photonics, Chatsworth, CA, USA.*
When annealed at temperature above 600 ºC, gratings in hydrogen-loaded fibers first completely decay and then grow back remaining stable even at temperature up to 1200 ºC. We attribute this to a grating of oxygen-deficient Ctr.s formed by water migration in between the grating fringes.

12:00pm – 1:30pm
Lunch Break

Location: Salon A-C
1:30pm – 3:15pm
MC ■ Photosensitivity and Chemistry
Martin Kristensen, Res. Ctr. COM, Kgs. Lyngby, Denmark.

MC1 1:30pm ►INVITED
The effect of UV lasers treatment on atomic (low frequency) and electronic (high frequency) parts of refractive index in silicate photosensitive glasses, *K. M. Golant, Fiber Optics Res. Ctr., A.M. Prokhorov General Physics Inst. of the Russian Acad. of Sciences, Moscow, Russian Federation; O. V. Butov, Fiber Optics Res. Ctr., A.M. Prokhorov General Physics Inst. of the Russian Acad. of Sciences, Moscow, Russian Federation.*
A correct application of the Kramers-Kronig relation to analysis of the refractive index frequency dependence in silica glasses transparency window lets one distinguish between contributions of atomic and electronic components to photorefractive effect if the refractive index measurement inaccuracy does not exceed 10^{-4}.

MC2 2:00pm
VUV and IR absorption spectra in pre-sensitized standard germanosilicate preform plates, *Matthieu Lancry, Phlam Lab., Villeneuve d'Ascq, France; Pierre Niay, Phlam Lab., Villeneuve d'Ascq, France; Marc Douay, Phlam Lab., Villeneuve d'Ascq, France; Patrick Cordier, LSPES Lab., Villeneuve d'Ascq, France; Christophe Depecker, LSPES Lab., Villeneuve d'Ascq, France; Isabelle Riant, Alcatel CIT - R&I, Marcoussis, France.*
H_2-loaded Ge-doped preform plates have been photo-sensitized and subsequently post-exposed using UV laser pulses at 193 nm. FTIR and VUV absorption spectroscopy has been carried out at each step of the exposure with a view to getting a better understanding of the photosensitization process.

MC3 2:15pm
The effects of 355nm Hypersensitisation on the properties of boron co-doped germanosilicate glass, *Albert Canagasabey, Australian Photonics Cooperative Res. Ctr., Eveleigh, Australia; John Canning, Australian Photonics Cooperative Res. Ctr., Eveleigh, Australia; Nathaniel Groothoff, Australian Photonics Cooperative Res. Ctr., Eveleigh, Australia.*
The photosensitivity enhancing effects of 355nm hypersensitisation for the fabrication of strong, stable Bragg gratings are investigated. The optically measurable changes with 355nm exposure of the glass in the ultraviolet and infrared regions are reported.

MC4 2:30pm

High photosensitivity of Al_2O_3-doped fibers to 193 nm and 157 nm excimer laser irradiation, *Yury V. Larionov, Fiber Optics Res. Ctr. Moscow, Russian Federation; Andrey A. Rybaltovsky, Fiber Optics Res. Ctr., Moscow, Russian Federation; Sergei L. Semjonov, Fiber Optics Res. Ctr., Moscow, Russian Federation; Mikhail M. Bubnov, Fiber Optics Res. Ctr., Moscow, Russian Federation; E. M. Dianov, Fiber Optics Res. Ctr., Moscow, Russian Federation; Sergey K. Vartapetov, Physics Instrumentation Ctr., Troitsk, Russian Federation; Mikhail A. Kurzanov, Physics Instrumentation Ctr., Troitsk, Russian Federation; Alexey Z. Obidin, Physics Instrumentation Ctr., Troitsk, Russian Federation; Vladimir A. Yamschikov, Physics Instrumentation Ctr., Troitsk, Russian Federation; Alexey N. Guryanov, Inst. of Chemistry of High-Purity Substances, Nizhnii Novgorod, Russian Federation; Mikhail V. Yashkov, Inst. of Chemistry of High-Purity Substances, Nizhnii Novgorod, Russian Federation; Andrey A. Umnikov, Inst. of Chemistry of High-Purity Substances, Nizhnii Novgorod, Russian Federation.*

Significant photosensitivity of aluminosilicate fibers (with and without Er codoping) was observed. Effect of photosensitization was demonstrated for the first time for such fibers. Potential to write gratings directly in Er-doped aluminosilicate fibers was demonstrated.

MC5 2:45pm

Enhancing fiber photosensitivity using dilute hydrogen in high-pressure mixtures, *Nirmal K. Viswanathan, 3M Co., Austin, TX, USA; William V. Dower, 3M Co., Austin, TX, USA; Dora M. Paolucci, 3M Co., Austin, TX, USA; Michael D. Barrera, 3M Co., St. Paul, MN, USA.*

Significant enhancement in fiber photosensitivity is demonstrated using dilute hydrogen in high-pressure mixtures in comparison with fibers loaded with pure hydrogen. Potential to sensitize fibers with < 1 atmosphere partial pressure of hydrogen is explored.

MC6 3:00pm

Paper Discussion

Location:

3:15pm – 3:45pm
Coffee Break

Location: Salon D-F

3:45pm – 5:45pm
MD ■ Poster Session

MD1

Stability of fiber Bragg grating wavelength calibration references, *Shellee D. Dyer, NIST, Boulder, CO, USA; Jonathan D. Kofler, NIST, Boulder, CO, USA; Robert J. Espejo, NIST, Boulder, CO, USA; Shelley M. Etzel, NIST, Boulder, CO, USA.*

We discuss the key considerations necessary to create stable fiber Bragg grating wavelength references. We describe two high-accuracy measurements to characterize the gratings, and we demonstrate gratings with wavelength stability better than 1 pm over 75 days.

MD2

Realization of chirped sampled fiber Bragg gratings for DWDM systems using multiple phase-shift technique, *Kien T. Dinh, Dept. of Frontier Informatics, Graduate School of Frontier Sciences, The Univ. of Tokyo, Tokyo, Japan; S. Yamashita, Dept. of Frontier Informatics, Graduate School of Frontier Sciences, The Univ. of Tokyo, Tokyo, Japan.*

Longer sampled gratings with more channels can be realized by using chirped phase mask and by trimming relative phases between grating sections while keeping the dispersion compensation function.

MD3

L-band all-fibre DFB-lasers pumped at 980nm and 1534nm, *Libin Fu, ORC, Univ. of Southampton, Southampton, UK; Morten Ibsen, ORC, Univ. of Southampton, Southampton, UK; Johan Nilsson, ORC, Univ. of Southampton, Southampton, UK; David J. Richardson, ORC, Univ. of Southampton, Southampton, UK; David N. Payne, ORC, Univ. of Southampton, Southampton, UK.*

The performance of an L-band fibre-DFB-laser is characterised when pumped at 1534nm and 980nm. >10mW of power is demonstrated at 1618nm under 980nm pumping. The thermally induced wavelength-shift is reduced by >10 times under 1534nm pumping.

MD4
Asymetry effect in holographic apodized phase mask for multichannel fiber Bragg gratings, *Michel Poulin, TeraXion, Sainte-Foy, PQ, Canada; François Trépanier, Teraxion, Sainte-Foy, PQ, Canada; Ghislain Bilodeau, TeraXion, Ste-Foy, PQ, Canada.*
The way complex apodization function of the diffraction efficiency of a holographically made phase mask is implemented has an effect on the spectral response of multichannel fiber Bragg gratings. Theoretical and experimental results are presented.

MD5
Phase mask period characterization with picometer accuracy using Bragg gratings and diffractive interferometric technique, *Dan Grobnic, Commmunication Res. Ctr. Canada, Ottawa, ON, Canada; Stephen J. Mihailov, Communication Res. Ctr. Canada, Ottawa, ON, Canada; Yves Jourlin, TSI Lab., Jean-Monet Univ., Saint-Etienne, France; Olivier Parriaux, TSI Lab., Jean-Monet Univ., Saint-Etienne, France; A. V. Tishchenko, TSI Lab., Jean-Monet Univ., Saint-Etienne, France; Andy G. Zanzal, Photronics Inc., Brookfield, CT, USA; D. P. Mathur, Photronics Inc., Brookfield, CT, USA; James Unruh, Photronics Inc., Brookfield, CT, USA.*
Bragg gratings made using the phase mask method depend heavily on the quality of the mask. A method capable of characterizing the quality of the phase mask with the accuracy required for high quality gratings is presented.

MD6
Low-thermal-sensitivity electric arc-induced long period gratings in Ge-free air-silica microstructure fibers, *Georges J. Humbert, Univ. of Rouen, Saint Etienne du Rouvray, France; A. Malki, Univ. of Rouen, Saint Etienne du Rouvray, France; S. Fevrier, Univ. of Limoges, Limoges Cedex, France; P. Roy, Univ. of Limoges, Limoges Cedex, France; D. Pagnoux, Univ. of Limoges, Limoges Cedex, France.*
We report the inscription of electric arc-induced long period fiber gratings in Ge-free air-silica microstructure fiber. The fabricated gratings have rejected bands situated in the telecom wavelength range and they exhibit attractive thermal properties.

MD7
Experimental results of a mode inverting grating coupler in an all-fiber geometry, *Mattias L. Åslund, Optical Fibre Tech. Ctr., Sydney, Australia; John Canning, Optical Fibre Tech. Ctr., Sydney, Australia; Leon Poladian, Optical Fibre Tech. Ctr., Sydney, Australia; C. Martijn de Sterke, Univ. of Sydney, Sydney, Australia.*
The theoretically proposed add-drop multiplexer based on antisymmetric grating coupling is realised using an all-fiber geometry. Conventional grating assisted couplers are shown to exhibit two high-reflection bands, whereas antisymmetric grating couplers have a single reflection band. The latter feature improves the filter characteristics substantially.

MD8
Tuning fiber Bragg grating with in-fiber light, *Kevin P. Chen, Univ. of Pittsburgh, Pittsburgh, PA, USA; Lucas Cashdollar, Univ. of Pittsburgh, Pittsburgh, PA, USA.*
The spectrum responses of fiber Bragg gratings controlled by in-fiber light were demonstrated. Fiber Bragg gratings coated with carbon films were heated with in-fiber high-power 910-nm diode laser light leaked through fiber cladding for resonance wavelength tuning, spectrum stretching, and compression.

MD9
Suppression of discrete cladding mode coupling in fibre slanted Bragg grating spectrum, *Emmanuel Kerrinckx, Univ. des Sciences et Tech. de Lille, Villeneuve d'Ascq, France; Arif Hidayat, Univ. des Sciences et Tech. de Lille, Villeneuve d'Ascq, France; Pierre Niay, Univ. des Sciences et Tech. de Lille, Villeneuve d'Ascq, France; Yves Quiquempois, Univ. des Sciences et Tech. de Lille, Villeneuve d'Ascq, France; Marc Douay, Univ. des Sciences et Tech. de Lille, Villeneuve d'Ascq, France; Isabelle Riant, Alcatel CIT - R&I, Marcoussis, France; Carlos De Barros, Alcatel CIT - R&I, Marcoussis, France.*
Slanted Bragg gratings (SBG) have been written in standard telecommunication fibres. Four different methods were studied in order to suppress the peaks induced by discrete cladding mode coupling in SBGs without the use of specific surrounding mediums.

MD10

High accuracy interrogation of a WDM FBG sensor array using radiation modes from a B-FBG, *Alexander G. Simpson, Aston Univ., Birmingham, UK; Kaiming Zhou, Jr., Aston Univ., Birmingham, UK; Lin Zhang, Aston Univ., Birmingham, UK; Ian Bennion, Aston Univ., Birmingham, UK.*

We report the development of a WDM optical sensor array interrogation system using the radiation modes from a BFBG. We present results indicating 70nm bandwidth, with 0.2ρm RMS noise and a minimum WDM spacing of 30ρm. We further show the system to be polarization independent.

MD11

Non-reciprocal behaviors in grating based chromatic dispersion compensators due to UV-induced losses, *Veronique Verdrager, Alcatel Corp. Res. Ctr., Marcoussis, France; Josselyne Gourhant, Alcatel Corp. Res. Ctr., Marcoussis, France; Estelle Gohin, Alcatel Corp. Res. Ctr., Marcoussis, France; Isabelle Riant, Alcatel Corp. Res. Ctr., Marcoussis, France; Yves Quiquempois, Univ. of Lille, Villeneuve d'Ascq, France; Pierre Niay, Univ. of Lille, Villeneuve d'Ascq, France; Marc Douay, Univ. of Lille, Villeneuve d'Ascq, France.*

It is demonstrated experimentally and theoretically that UV-induced excess distributed background loss can account for a tilt on the flat top of the reflectivity spectra of chirp grating leading to a non-reciprocal behavior

MD12

Multiple wavelength reference based on interleaved, sample fiber gratings and molecular absorption, *Mary A. Rowe, NIST, Boulder, CO, USA; William C. Swann, NIST, Boulder, CO, USA; Sarah L. Gilbert, NIST, Boulder, CO, USA.*

We present a wavelength calibration reference based on sampled fiber gratings stabilized to a molecular absorption line. Such a hybrid reference can provide multiple stable calibration peaks over a wide range of wavelengths.

MD13

Fiber optical structure for tunable dispersion compensation using cascaded long-period gratings, *Michael Otto, TU Dresden, IfN, Dresden, Germany; Ignacio González Insua, TU Dresden, IfN, Dresden, Germany; Thomas Duthel, TU Dresden, IfN, Dresden, Germany; Falk Michael, TU Dresden, IfN, Dresden, Germany; Christian Schäffer, TU Dresden, IfN, Dresden, Germany.*

A structure that utilizes the mode conversion of long-period gratings to compensate the residual dispersion in high bit rate transmissions is presented. Due to the propagation of the used modes in the same fiber the device is inherent stable and has a low insertion loss.

MD14

Multiwavelength-switchable SOA-fiber ring laser using a polarization beam splitter and sampled fiber Bragg gratings, *Yong Wook Lee, Seoul Natl. Univ., Seoul, Republic of Korea; Byoungho Lee, Seoul Natl. Univ., Seoul, Republic of Korea; Jaehoon Jung, Dankook Univ., Seoul, Republic of Korea.*

In this paper we propose a novel multiwavelength-switchable fiber laser based on a semiconductor optical amplifier and sampled fiber Bragg gratings within the ring cavity, using high polarization selectivity of a polarization beam splitter.

MD15

A flexible approach for the apodization of planar waveguide Bragg gratings,
Filip Floreani, Aston Univ., Birmingham, UK; Lin Zhang, Aston Univ., Birmingham, UK; Hans-Jürgen Deyerl, DTU – Tech. Univ. of Denmark, Kgs. Lyngby, Denmark; Nikolai Plougmann, DTU – Tech. Univ. of Denmark, Kgs. Lyngby, Denmark; Haiyan Ou, DTU – Tech. Univ. of Denmark, Kgs. Lyngby, Denmark; Jesper B. Jensen, DTU – Tech.Univ. of Denmark, Kgs. Lyngby, Denmark; Martin Kristensen, DTU – Tech. Univ. of Denmark, Kgs. Lyngby, Denmark.

A novel single-step technique for the apodization of planar waveguide Bragg gratings based on the polarization control method is proposed. First results are presented, showing successful side-lobe suppression in the reflection spectrum of the gratings.

MD16

Spectral response of chirped fibre Bragg gratings written in Erbium doped fibres, *Rosa Romero, INESC-Porto, Porto, Portugal; H. M. Salgado, INESC-Porto, Porto, Portugal; O. Frazão, INESC-Porto, Porto, Portugal; P. V. Marques, INESC-Porto, Porto, Portugal; J. L. Santos, INESC-Porto, Porto, Portugal.*
A chirped fibre Bragg grating was written in Erbium doped fibre. It was found that the slope of the reflected spectral power of the chirped FBG can be tuned by changing the pump intensity. A technique for an optical interrogation FBGs sensing heads was demonstrated.

MD17

New iterative approach for designing Bragg gratings, *Nikolai Plougmann, COM, Kgs. Lyngby, Denmark; Martin Kristensen, COM, Kgs. Lyngby, Denmark; Hans-Jürgen Deyerl, COM, Kgs. Lyngby, Denmark.*
We present a new iterative method for designing Bragg gratings based on the Levenberg-Marquardt method of minimizing a chi-squared merit function. It is effective and suitable for designing both weak and strong unchirped gratings.

MD18

Domain engineering in $LiNbO_3$ thin films grown by liquid phase epitaxy, *Ji-Won Son, Stanford Univ., Stanford, CA, USA; Yin Yuen, Stanford Univ., Stanford, CA, USA; Sergei S. Orlov, Stanford Univ., Stanford, CA, USA; Bill Phillips, Stanford Univ., Stanford, CA, USA; Ludwig Galambos, Stanford Univ., Stanford, CA, USA; Vladimir Y. Shur, Ural State Univ., Ekaterinburg, Russian Federation; Lambertus Hesselink, Stanford Univ., Stanford, CA, USA.*
We demonstrate periodic domain engineering using a direct-write electron beam poling technique in Z^--oriented liquid phase epitaxy $LiNbO_3$ films grown on $LiNbO_3$ and $LiTaO_3$ substrates for waveguide applications. Submicron domains (~500 nm) are experimentally observed.

MD19

Polarization devices based on Bragg reflector waveguides, *Eli Simova, Inst. for Microstructural Sciences, Natl. Res. Council, Ottawa, ON, Canada; Ilya Golub, Inst. for Microstructural Sciences, Natl. Res. Council, Ottawa, ON, Canada.*
Novel designs of polarization devices based on Bragg reflector wabeguides in a high index contrast material have been proposed. The presented numerical simulations with a 3D semivectorial beam propagation method demonstrate their performance.

MD20

A comparative study of numerical methods for the calculation of the birefringence of UV-illuminated fibers, *Nezih Belhadj, Dépt. de génie électrique et de génie informatique, Univ. Laval, Québec, PQ, Canada; Kokou Dossou, Dépt. de mathématique et de statistique, Univ. Laval, Québec, PQ, Canada; Xavier Daxhelet, Dépt. de génie physique, École Polytechnique de Montréal, Montréal, PQ, Canada; Sophie LaRochelle, Dépt. de génie électrique et de génie informatique, Univ. Laval, Québec, PQ, Canada; Suzanne Lacroix, Dépt. de génie physique, École Polytechnique de Montréal, Montréal, PQ, Canada; Marie Fontaine, Dépt. d'informatique, Univ. du Québec en Outaouais, Hull, PQ, Canada.*
We compare the effective indices and the birefringence of a fiber with an asymmetric transverse profile, calculated by three numerical methods, one vectorial and two scalar formulations with polarization corrections.

MD21

Recording of polarization holograms in photodarkened amorphous As_2S_3 thin films, *Karen Asatryan, Laval Univ., Quebec, PQ, Canada; Simon Frederick, Laval Univ., Quebec, PQ, Canada; Tigran Galstian, Laval Univ., Quebec, PQ, Canada; Réal Vallée, Laval Univ., Quebec, PQ, Canada.*
The inscription of polarization gratings in amorphous As_2S_3 thin films is shown to be accompanied by a scalar modulation of the same period. An exception is the (s + p) recording configuration where a pure polarization grating may be obtained even for relatively high photoexposures.

MD22

Concept for monitoring fiber Bragg grating fabrication process, *Dmitrii Y. Stepanov, Bandwidth Foundry Pty. Ltd., Sydney, Australia; Alexander V. Buryak, Bandwidth Foundry Pty. Ltd., Sydney, Australia; Mark G. Sceats, Australian Photonics Pty. Ltd., Sydney, Australia.*

Complex coupling coefficient along a fiber Bragg grating under fabrication is derived from its complex reflection coefficient measured at a single wavelength thus offering a concept for a closed-loop grating fabrication system.

MD23

Study of the properties of arc-induced long-period gratings and Bragg gratings in B/Ge doped fibers, *Gaspar M. Rego, INESC-Porto, Porto, Portugal; J. L. Santos, INESC-Porto, Porto, Portugal; P.V. S. Marque, INESC-Porto, Porto, Portugal; H. M. Salgado, INESC-Porto, Porto, Portugal.*

We have investigated the possibility to erase arc-induced long period gratings through uniform exposure to UV laser radiation and their potential recover by thermal annealing. The temperature stability of UV/arc-induced gratings is also presented.

MD24

Photosensitivity of As_2S_3 thin films at 1.5 µm, *Nicolas Hô, Univ. Laval, Quebec, PQ, Canada; Jacques M. Laniel, Univ. Laval, Quebec, PQ, Canada; Alain Villeneuve, ITF Optical Tech. Inc., Montréal, PQ, Canada; Réal Vallée, Univ. Laval, Quebec, PQ, Canada.*

The chalcogenide glass As_2S_3 is shown to be photosensitive to a wavelength of 1.5 µm, which is a problem for the development of chalcogenide-based integrated optical devices. Self-writing experiments demonstrate the photosensitivity to pulsed guided light inside slab waveguides and ridge waveguides.

MD25

UV-Induced non-local stress relaxation in bimaterial systems, *Harendra N. Fernando, Royal Inst. of Tech., Kista, Sweden; Lech Wosinski, Royal Inst. of Tech., Kista, Sweden; B. Jaskorzynska, Royal Inst. of Tech., Kista, Sweden; M. Dainese, Royal Inst. of Tech., Kista, Sweden; J. Canning, Optical Fiber Tech. Ctr., The Univ. of Sydney, Sydney, Australia.*

The effect of stress-relaxation when irradiation strikes the bi-material interface of a silica-on-silicon system using 193nm ArF laser and the importance of non-local stress-relaxation in determining negative index change is reported.

MD26

UV-induced index changes in Ce-doped and undoped fluoride glass, *Marcel Zeller, Swiss Federal Inst. of Tech., Lausanne, Switzerland; Theo Lasser, Swiss Federal Inst. of Tech., Lausanne, Switzerland; Hans G. Limberger, Swiss Federal Inst. of Tech., Lausanne, Switzerland; Gwenael Mazé, Le Verre Fluore, Bruz, France.*

Ce-doped and undoped fluoride glasses have been exposed to UV-irradiation. Pulsed 193 and 248 nm as well as cw 244 nm UV-induced index changes are evaluated using Kramers-Kronig relation and a layer-peeling polishing technique.

MD27

Bragg gratings in a new photosensitive material–photo-thermo-refractive glass, *Leonid B. Glebov, School of Optics/CREOL, Orlando, FL, USA; Igor V. Ciapurin, School of Optics/CREOL, Orlando, FL, USA; Larissa N. Glebova, School of Optics/CREOL, Orlando, FL, USA; Vadim I. Smirnov, School of Optics/CREOL, Orlando, FL, USA.*

Reflecting and transmitting Bragg gratings with efficiency up to 98% working from 400 to 2700 nm are created in silicate glass. Applications for spectral and angular selection, laser beam deflection, sampling and combining are demonstrated.

MD28

Photosensitivity and induced losses in phosphosilicate fibers exposed to 157 and 193 nm irradiation, *Yury V. Larionov, Fiber Optics Res. Ctr., Moscow, Russian Federation; Andrey A. Rybaltovsky, Fiber Optics Res. Ctr., Moscow, Russian Federation; Sergei L. Semjonov, Fiber Optics Res. Ctr., Moscow, Russian Federation; Mikhail M. Bubnov, Fiber Optics Res. Ctr., Moscow, Russian Federation; Eugeny M. Dianov, Fiber Optics Res. Ctr., Moscow, Russian Federation; Sergey K. Vartapetov, Physics Instrumentation Ctr., Troitsk, Russian Federation; Mikhail A. Kurzanov, Physics Instrumentation Ctr., Troitsk, Russian Federation; Alexey Z. Obidin, Physics Instrumentation Ctr., Troitsk, Russian Federation; Vladimir A. Yamschikov, Physics Instrumentation Ctr., Troitsk, Russian Federation.*

Photosensitivity and induced losses in phosphosilicate fibers depend on irradiation wavelength. The best induced index/loss relation has been obtained for H2-loaded samples at 157 nm irradiation. Pre-exposure procedure failed to decrease the induced losses.

MD29

Refractive index change and presensitization using 172-nm excimer lamp, *Akira Sakamoto, Fujikura Ltd., Chiba, Japan; Satoshi Okude, Fujikura Ltd., Chiba, Japan; Daiichiro Tanaka, Fujikura Ltd., Chiba, Japan; Akira Wada, Fujikura Ltd., Chiba, Japan.*

Refractive index change and presensitization effect induced by irradiation of a xenon excimer lamp (λ=172nm) is studied. The refractive index changes over 0.005 and 0.003 are confirmed in hydrogenated and presensitized fibers respectively.

MD30

Thermal stability of UV-written gratings in low- and high Ge content fibers, *Henrik R. Sørensen, COM, Tech. Univ. of Denmark, Kgs. Lyngby, Denmark; Hans-Jürgen Deyerl, COM, Tech.Univ. of Denmark, Kgs. Lyngby, Denmark; Martin Kristensen, COM, Tech. Univ. of Denmark, Kgs. Lyngby, Denmark.*

A systematic study of the thermal decay of Bragg gratings in high and low Ge-content fibers is presented. The resulting annealing curves are discussed in the framework of three different models of UV-induced index changes.

MD31

Annealing of UV-induced fiber gratings written in Ge-doped fibers: investigation of dose and strain effects, *Sergei A. Vasiliev, Fiber Optics Res. Ctr., Moscow, Russian Federation; Oleg I. Medvedkov, Fiber Optics Res. Ctr., Moscow, Russian Federation; Andrei S. Bozhkov, Fiber Optics Res. Ctr., Moscow, Russian Federation; E. M. Dianov, Fiber Optics Res. Ctr., Moscow, Russian Federation.*

Effects of UV-dose and fiber strain on annealing properties of fiber gratings written in Ge-doped fibers have been experimentally investigated. A new band in the distribution of the activation energy of the grating thermal decay with a Ctr. at 2.9 eV has been observed.

MD32

Abnormal photosensitivity effects and the formation of type IA FBGs, *Alexander G. Simpson, Aston Univ., Birmingham, UK; Lin Zhang, Aston Univ., Birmingham, UK; Kaiming Zhou, Aston Univ., Birmingham, UK; Ian Bennion, Aston Univ., Birmingham, UK.*

We report the abnormal photosensitivity effects leading to the formation of Type IA FBGs. We show the rate at which these gratings form is related to the intensity of the UV inscription laser. We report the first measurement of the reflection along the gratings' length.

MD33

Luminescence microscopy of UV written waveguides, Mikael Svalgaard, Res. Ctr. COM, Kgs. Lyngby, Denmark; Anders Harpøth, Res. Ctr. COM, Kgs. Lyngby, Denmark; Tue Rosbirk, Res. Ctr. COM, Kgs. Lyngby, Denmark.

We present a characterization method based on the luminescent properties of UV written waveguides to obtain the UV induced index-distribution, verified by comparison with measurements performed with the refracted near field technique.

MD34

Spectral and temporal characteristics of luminescence from hydrogen-loaded germanium-doped fiber excited at 244nm, *Martin Kristensen, Res. Ctr. COM, DTU, Kgs. Lyngby, Denmark; John Canning, OFTC, Univ. of Sydney, Natl. Innovation Ctr., Australian Tech. Park, Sydney, Australia.*
Hydrogen-loaded fiber exhibits a broader luminescence spectrum than pristine fiber when irradiated with ultraviolet light. The lifetime of the luminescence is extended and the intensity and shape remain almost constant during the irradiation. We investigate the differences and present two models for interpretation.

MD35

Electron beam induced structural changes in Ge-doped silica fabricated by planar-FHD and tube-deposited MCVD, *Sonia García Blanco, Univ. of Glasgow, Glasgow, UK; Andrew Glidle, Univ. of Glasgow, Glasgow, UK; Jon M. Cooper, Univ. of Glasgow, Glasgow, UK; Richard M. De La Rue, Univ. of Glasgow, Glasgow, UK; Anne-Sophie Jacqueline, Univ. Paris-Sud, Paris, France; Bertrand Poumellec, Univ. Paris-Sud, Paris, France; J. S. Aitchison, Univ. of Toronto, Toronto, ON Canada.*
The effect in depth of electron-beam irradiation has been characterized for Ge-doped planar-FHD and tube-deposited MCVD silica. Step height measurements followed by elastic calculations allowed the study of the densification depth profile. Confocal Raman spectroscopy showed the structural rearrangements in depth.

MD36

Direct Grating Writing as a characterization technique for Direct UV written waveguide structures, *Gregory D. Emmerson, Optoelectronics Res. Ctr., Univ. of Southampton, Southampton, UK; Corin B. Gawith, Optoelectronics Res. Ctr., Univ. of Southampton, Southampton, UK; Sam P. Watts, Optoelectronics Res. Ctr., Univ. of Southampton, Southampton, UK; Ian J. Sparrow, Optoelectronics Res. Ctr., Univ. of Southampton, Southampton, UK; V. Albanis, Optoelectronics Res. Ctr., Univ. of Southampton, Southampton, UK; Richard B. Williams, Optoelectronics Res. Ctr., Univ. of Southampton, Southampton, UK; Peter G. Smith, Optoelectronics Res. Ctr., Univ. of Southampton, Southampton, UK; S. G. McMeekin, Alcatel Optronics UK, Livingston, UK; J. R. Bonar, Alcatel Optronics UK, Livingston, UK; R. I. Laming, Alcatel Optronics UK, Livingston, UK.*
We use the Direct Grating Writing technique, based on Direct UV writing to define Bragg channel waveguides, investigating the relationship between the properties of the glass, the writing conditions, and the strength of the waveguide.

MD37

Second harmonic generation in thermally-poled lead-glass: silica waveguides, *Y. Luo, Univ. of New Mexico, Albuquerque, NM, USA; A. Biswas, Univ. of New Mexico, Albuquerque, NM, USA; S. Brueck, Univ. of New Mexico, Albuquerque, NM, USA.*
Thermal poling of silica:lead-glass:silica waveguides formed by laser ablation (Pb glass) and evaporation is reported. The nonlinearity is larger than in silica, is localized within the Pb-glass layer, and is stable against UV exposure.

MD38

Surface topography change induced by poling in Ge doped silica glass films, *Bertrand Poumellec, CNRS-UPS, Orsay, France; Y. Ren, Res. Ctr. COM, Tech. Univ. of Denmark, Kgs. Lyngby, Denmark; M. Kristensen, Res. Ctr. COM, Tech. Univ. of Denmark, Kgs. Lyngby, Denmark.*
We show that the poling process induces a surface topography change. The size of the effect is around 10 nm for a few microns thick silica layer and connected to the polarity of the external voltage.

MD39
High-temperature poling of bulk silica glass: measurements of poling current and Maker fringes, *Nicolas Godbout, École Polytechnique de Montréal, Montréal, PQ, Canada; Emerson Nérat, École Polytechnique de Montréal, Montréal, PQ, Canada; Vincent Tréanton, École Polytechnique de Montréal, Montréal, PQ, Canada; Suzanne Lacroix, École Polytechnique de Montréal, Montréal, PQ, Canada.*
Thermal poling of Suprasil 300™ silica glass samples is performed at temperatures up to 800°C. The cathodic current measured during poling shows that significant charge injection occurs. Measurements of the $\chi^{(2)}$ susceptibility by the Maker fringes technique are shown.

MD40
Thermal poling studies in phosphate glasses with low and high alkali content, *Prissana Thamboon, Dept. of Applied Science, UC Davis and Lawrence Livermore Natl. Lab., Livermore, CA, USA; Denise M. Krol, Dept. of Applied Science, UC Davis and Lawrence Livermore Natl. Lab., Livermore, CA, USA.*
Second-order nonlinearities were induced in lanthanum phosphate and sodium aluminum phosphate glasses. Maker fringe experiments show that the induced nonlinearities in the two glass systems have different magnitudes and spatial profiles. The microscopic origin of $\chi^{(2)}$ is discussed in terms of different charge migration models.

■ Tuesday
■ September 2, 2003

Location: Salon Foyer
7:30am – 4:30pm
Registration/Speaker and Presider Check-in

Location: Salon A-C
8:30am – 10:00am
TuA ■ Planar Devices
Martin Guy, TeraXion, Sainte Foy, PQ, Canada

TuA1 8:30am ►INVITED
UV trimming of AWG devices, *Kazumasa Takada, Gunma Univ., Kiryu, Japan; M. Abe, NTT Corp., Atsugi, Japan.*
We describe a method for improving AWG performance. This is a photosensitive phase adjustment technique with which the arrayed waveguide part is irradiated with UV laser light through a metal mask. We can reduce both the adjacent crosstalk and dispersion simultaneously for all channels.

TuA2 9:00am
Molecular hydrogen in planar waveguide structures under high-pressure loading, *Kjartan Færch, COM Ctr., DTU, Kgs. Lyngby, Denmark; Mikael Svalgaard, COM Ctr., DTU, Kgs. Lyngby, Denmark.*
The concentration of molecular hydrogen is measured in planar waveguide structures using a Bragg grating and the fundamental absorption for a loading up to 1500 bar. The hydrogen causes a strain-induced birefringence, which may be used as an additional hydrogen probe.

TuA3 9:15am
Ultra-wide detuning through Direct Grating Writing of planar Bragg structures, *Gregory D. Emmerson, Optoelectronics Res. Ctr., Univ. of Southampton, Southampton, UK; Corin B. Gawith, Optoelectronics Res. Ctr., Univ. of Southampton, Southampton, UK; Richard B. Williams, Optoelectronics Res. Ctr., Univ. of Southampton, Southampton, UK; Peter G. Smith, Optoelectronics Res. Ctr., Univ. of Southampton, Southampton, UK; S. G. McMeekin, Alcatel Optronics UK, Livingston, UK; J. R. Bonar, Alcatel Optronics UK, Livingston, UK; R. I. Laming, Alcatel Optronics UK, Livingston, UK.*
We demonstrate a process of planar Bragg grating writing capable of defining Bragg gratings throughout the S, C and L bands using a computer controlled detuning technique.

TuA4 9:30am
Direct UV writing of multimode-interference couplers, *Frank Knappe, Tech. Univ. Hamburg – Harburg, Hamburg, Germany; Jörg Voigt, Tech. Univ. Hamburg – Harburg, Hamburg, Germany; Hagen Renner, Tech. Univ. Hamburg – Harburg, Hamburg, Germany; Ernst Brinkmeyer, Tech. Univ. Hamburg – Harburg, Hamburg, Germany.*
A direct UV-writing technique for the fabrication of multimode-interference couplers is presented. High-quality 1x2, 1x3 and 1x4 splitters are experimentally realized in close agreement with BPM design.

TuA5 9:45am
UV written variable optical attenuator, *Mikael Svalgaard, Res. Ctr. COM, Lyngby, Denmark; Kjartan Færch, Res. Ctr. COM, Lyngby, Denmark.*
We show that direct UV writing of waveguides is suitable for mass production of variable optical attenuators with low insertion loss, low PDL and high dynamic range. The fabrication setup is robust, providing good device performance over a period of many months without maintenance.

Location: Salon D-G
10:00am – 10:30am
Coffee Break

Location: Salon A-C
10:30am – 12:00pm
TuB ■ Grating Properties II
Henry Lee, UC Irvine, Irvine, CA, USA.

TuB1 10:30am ►Invited
Novel grating designs and properties, *Lawrence Chen, McGill Univ., Montreal, PQ, Canada.*
We provide an overview of novel grating designs and their applications for optical pulse shaping, in particular the synthesis of arbitrary optical pulse waveforms and the generation of customized ultrahigh repetition rate pulse bursts.

TuB2 11:00am
Fabrication of fiber Bragg gratings (FBG) in all-SiO_2 and Ge-doped core fibers with 800 nm picosecond radiation, *Stephen J. Mihailov, Comm. Res. Ctr. Canada, Ottawa, ON, Canada; Chris W. Smelser, Comm. Res. Ctr. Canada, Ottawa, ON, Canada; Dan Grobnic, Comm. Res. Ctr. Canada, Ottawa, ON, Canada.*
FBG's were written with 800-nm 2-ps laser pulses using a phase mask in SMF-28 and all-silica-core fiber. Self-apodized index modulation values of $\sim 4\times 10^{-3}$ were achieved without any fiber sensitization.

TuB3 11:15am
Reset-free phase shifter in a Sagnac-type interferometer for control of chirp and apodization of Bragg gratings, *Christian Knothe, Tech. Univ. Hamburg-Harburg, Hamburg, Germany; E. Brinkmeyer, Tech. Univ. Hamburg-Harburg, Hamburg, Germany.*
We demonstrate a reset-free phase shifter in a Sagnac-type phase-mask interferometer. With one phase mask only we inscribe Bragg gratings with almost arbitrary wavelength, chirp and apodization. This phase shifter is used as well for correction of errors due to the scanning process.

TuB4 11:30am
High channel-count sampled fiber Bragg gratings synthesized by a genetic algorithm, *Olivier Durand, Alcatel Res. & Innovation, Marcoussis, France; Laurent Dumas, Lab. Jacques-Louis Lions, Univ. Paris 6, Paris, France.*
We propose to use a genetic algorithm for optimizing the design of high-channel-count sampled fiber Bragg gratings and show that it leads to better results than classical methods based on a Fourier transform approach.

TuB5 11:45am
Experimental synthesis of uniform fiber Bragg gratings, *Xavier Chapeleau, LPIO Univ. of Nantes, Nantes, France; Dominique Leduc, LPIO Univ. of Nantes, Nantes, France; Cyril Lupi, LPIO Univ. of Nantes, Nantes, France; Roger Le Ny, LPIO Univ. of Nantes, Nantes, France; Marc Douay, PhLAM Univ. of Lille, Nantes, France; Pierre Niay, PhLAM Univ. of Lille, Lille, France; Christian Boisrobert, LPIO Univ. of Nantes, Nantes, France.*
The combination of optical low coherence reflectometry together with layer peeling algorithm allows for the experimental synthesis of fiber Bragg gratings. In this paper, we compare the profile given by this method with one obtained by an independant Krug measurement and show its better sensitivity.

12:00pm – 1:30pm
Lunch Break

Location: Salon A-C
1:30pm – 3:00pm
TuC ■ Nonlinear Effects and Poling Devices
Nicolas Godbout, École Polytechnique de Montréal, Montréal, PQ, Canada.

TuC1 1:30pm
Periodic internal fiber electrode fabricated by laser ablation, *Niklas E. Myrén, KTH, Kista, Sweden; Walter Margulis, Acreo, Kista, Sweden; Michael Fokine, Acreo, Kista, Sweden; Oleksandr Tarasenko, Acreo, Kista, Sweden; Lars-Erik Nilsson, Acreo, Kista, Sweden.*
Continuous silver films were chemically deposited by flowing a Ag-solution in the holes of twin-hole fibers. Subsequently, periodic internal electrodes were fabricated by point-by-point side exposure of 0.53 μ m radiation, causing laser ablation.

TuC2 1:45pm
Nonlinearity of the electro-optic effect in poled waveguides, *Raman Kashyap, Ecole Polytechnique de Montreal, Montreal, PQ, Canada; Fatima C. Garcia, Pontíficia Univ. Católica do Rio de Janeiro, Rio de Janeiro, Brazil; Laura Vogelaar, Univ. of Twente, Enschede, Netherlands.*
The induced nonlinearity in poled glass waveguides is shown to be strongly influenced by the Kerr effect. Eectro-optic modulation in a poled waveguide Mach-Zehnder interferometer induces second-harmonic distortion, elucidated for the first time. Poling increases the Kerr coeffecient by two.

TuC3 2:00pm
Microscopic model for the second-order nonlinearity creation in thermally poled bulk silica glasses, *Alexandre Kudlinski, Lab. de Physique des Lasers, Atomes et Molécules (PhLAM), Villeneuve d'Ascq, France; Gilbert Martinelli, Lab. de Physique des Lasers, Atomes et Molécules (PhLAM), Villeneuve d'Ascq, France; Yves Quiquempois, Lab. de Physique des Lasers, Atomes et Molécules (PhLAM), Villeneuve d'Ascq, France; Hassina Zeghlache, Lab. de Physique des Lasers, Atomes et Molécules (PhLAM), Villeneuve d'Ascq, France.*
We study numerically the dynamics of the induced second-order nonlinearity in Infrasil® silica glass, with a two charge carrier model. An optimum in poling time is found. Its position depends on the sample thickness.

TuC4 2:15pm
Stability of the second-order optical nonlinearity in poled glasses, *Olivier Deparis, Optoelectronics Res. Ctr., Southampton, UK; Costantino Corbari, Optoelectronics Res. Ctr., Southampton, UK; Peter G. Kazansky, Optoelectronics Res. Ctr., Southampton, UK; Koichi Sakaguchi, Kansai Res. Ctr., Itami, Japan.*
Silicate glasses, in a wide composition range of glass host and dopants, were thermally poled and then isothermally annealed at 200 ºC. Strong dependence of the stability of $\chi^{(2)}$ on glass material composition was observed.

TuC5 2:30pm ►INVITED
Generating quiet continua: Noise limitations to supercontinuum generation in photonic crystal fiber, *John M. Dudley, Univ. de Franche Comte, Besançon, France; Stephane Coen, Univ. Libre de Bruxelles, Bruxelles, Belgium; Nathan R. Newbury, NIST, Boulder, CO, USA; Kristan L. Corwin, NIST, Boulder, CO, USA; Scott A. Diddams, Natl. Inst. of Standards and Tech., Boulder, CO, USA; Brian R. Washburn, NIST, Boulder, CO, USA; Robert S. Windeler, OFS Lab., Murray Hill, NJ, USA.*
Supercontinuum generation in photonic crystal fiber can be associated with intensity fluctuations arising from the nonlinear amplification of input pulse noise. Experiments and simulations are used to identify system parameters which minimize these fluctuations.

Location: Salon D-G
3:00pm – 3:30pm
Coffee Break

Location: Salon A-C
3:30 – 4:45pm
TuD ■ Grating Properties III
James Brennan, 3M Co., Austin, TX, USA.

TuD1 3:30pm ►INVITED
Novel grating devices in few-mode fibers, *Siddharth Ramachandran, OFS Lab., Murray Hill, NJ, USA.*
In this talk we will show that the unique dispersive properties of various modes in few-mode-fibers, in conjunction with the ability to couple between them with gratings, leads to devices that offer novel solutions for dispersion-compensation, spectral-shaping and polarisation-control, to name a few applications.

TuD2 4:00pm
Inverse scattering design of fiber Bragg gratings with cladding mode losses compensation, *Fabio Ghiringhelli, Optoelectronics Res. Ctr., Univ. of Southampton, Southampton, UK; Mikhail N. Zervas, Optoelectronics Res. Ctr., Univ. of Southampton, Southampton, UK.*
Cladding mode losses are included in Bragg gratings' design using a fast, discrete transfer matrix method and an iterative inverse scattering algorithm. Simulations show perfect equalization in a linear dispersion compensating grating written on a standard SMF fiber.

TuD3 4:15pm
Dynamics of the UV blue luminescence intensity: Observation of the local mean photoinduced refractive index in Bragg grating, *Laurent Paccou, Univ. de Lille I, Villeneuve d'Ascq, France; Matthieu Lancry, Univ. de Lille I, Villeneuve d'Ascq, France; Pierre Niay, Univ. de Lille I, Villeneuve d'Ascq, France; Marc Douay, Univ. de Lille I, Villeneuve d'Ascq, France; Isabelle Riant, Alcatel C.I.T R&I, Marcoussis, France; Bertrand Poumellec, Univ. Paris Sud, Orsay, France; Diana Dragoe, Univ. de Paris Sud, Orsay, France.*
Applications of the UV excited blue (410 nm) photoluminescence was demonstrated for grating characterizations in the Δn_{mean} range of $1.5.10^{-4}$ to 2.10^{-3}. Spectra of this fluorescence were studied in order to enlighten defect center contributions.

TuD4 4:30pm
Apodization of lithographically-scribed planar holographic Bragg reflectors via effective gray-scale, *Dmitri Iazikov, LightSmyth Tech., Eugene, OR, USA; Christoph Greiner, LightSmyth Tech., Eugene, OR, USA; Thomas W. Mossberg, LightSmyth Tech., Eugene, OR, USA.*
We demonstrate that photolithographically-scribed, slab-waveguide-based, holographic Bragg reflectors support a unique approach to apodization and overlay that uses fixed-depth etching and partial contour writing to achieve continuous reflective amplitude control.

Location: Salon A-C
4:45pm – 5:30pm
TuE ■ Postdeadline Session

Location: Salon D-G
5:30pm – 7:00pm
Conference Reception

■ Wednesday
■ September 3, 2003

Location: Salon Foyer

8:00am – 4:00pm
Registration/Speaker and Presider Check-In

Location: Salon

8:30am – 10:00am
WA ■ Photosensitivity and Structure

John Canning, Univ. of Sydney, Sydney, Australia.

WA1 8:30am ►INVITED
193nm photosensitivity in silica and local laser-induced fs heating and cooling, *Peter Harrowell, Univ. of Sydney, Sydney, Australia; Adam Wootton, Univ. of Sydney, Sydney, Australia.*
We have used classical molecular dynamic simulations to model the long-lived structural effects of ultraviolet irradiation on amorphous silica. We present evidence that the observed densification arises as a result of the local melting generated by the radiation followed by rapid cooling. We examine physical factors that influence the sign and magnitude of this density change.

WA2 9:00am
UV-induced stress changes in phosphorous-doped fibers drawn at different drawing tensions, *Florian Dürr, Swiss Federal Inst. of Tech., Lausanne, Switzerland; Hans Georg Limberger, Swiss Federal Inst. of Tech., Lausanne, Switzerland; René Paul Salathé, Swiss Federal Inst. of Tech., Lausanne, Switzerland; Francois Cochet, Cabloptic SA, Cortaillod, Switzerland; Andrei A. Rybaltovsky, Fiber Optics Res. Ctr. at the General Physics Inst., Russian Acad. of Sciences, Moscow, Russian Federation; Yuri V. Larionov, Fiber Optics Res. Ctr. at the General Physics Inst., Russian Acad. of Sciences, Moscow, Russian Federation; Sergei L. Semjonov, Fiber Optics Res. Ctr. at the General Physics Inst., Russian Acad. of Sciences, Moscow, Russian Federation; E. M. Dianov, Fiber Optics Res. Ctr. at the General Physics Inst., Russian Acad. of Sciences, Moscow, Russian Federation.*
Stress changes in hydrogenated phosphorous-doped fibers after Bragg grating inscription have been measured. Fibers with three different drawing tensions have been investigated. The core stress was found to increase independently of the initial stress state.

WA3 9:15am
Effects of large compressive-stresses on photosensitive optical fibres and Bragg gratings, *M. R. Mokhtar, Optoelectronics Res. Ctr., Univ. of Southampton, Southampton, UK; S. A. Butler, Optoelectronics Res. Ctr., Univ. of Southampton, Southampton, UK; D. J. Richardson, Optoelectronics Res. Ctr., Univ. of Southampton, Southampton, UK; M. Ibsen, Optoelectronics Res. Ctr., Univ. of Southampton, Southampton, UK.*
A study on the effects of axial stresses in optical fibres is presented. Results show large induced losses dependent on core-composition and ultra-violet light exposure. Additionally a stress-induced increase in gratings-strength is observed.

WA4 9:30am
Dependence of the femtosecond laser damage thresholds with the chemical composition of the glass, *L. Sudrie, Lab. d'Optique Appliquée, ENSTA, Palaiseau, France; M. Franco, Lab. d'Optique Appliquée, ENSTA, Palaiseau, France; B. Prade, Lab. d'Optique Appliquée, ENSTA, Palaiseau, France; A. Mysyrowicz, Lab. d'Optique Appliquée, ENSTA, Palaiseau, France; Bertrand Poumellec, CNRS-UPS, Orsay, France.*
Among the two femtosecond laser damage thresholds exhibited by glasses, we show that the second one is dependent on the chemical composition. The Ge or P doping decreases the power threshold contrary to F.

WA5 9:45am
Nanostructuring of transparent materials by light, *Peter G. Kazansky, Photon Craft Project, Japan Science and Tech. Corp. and Shanghai Inst. of Optics and Fine Mechanics, Chinese Acad. of Sciences, Kyoto, Japan; Yasuhiko Shimotsuma, R&D Kagoshima, Kyocera Corp., Kokubu, Japan; Jianrong Qiu, Photon Craft Project, Japan Science and Tech. Corp. and Shanghai Inst. of Optics and Fine Mechanics, Chinese Acad. of Sciences, Kyoto, Japan; Erica Bricchi, Optoelectronics Res. Ctr., Southampton, UK; Kazuyuki Hirao, Dept. of Material Chemistry, Graduation School of Engineering, Kyoto Univ., Kyoto, Japan.*
The smallest embedded structures ever created by light in transparent materials are observed in the experiments on femtosecond direct writing. The phenomenon is interpreted in terms of interference between light and bulk electron acoustic wave, resulting in periodic structural changes in glass.

Location: Salon D-G
10:00am – 10:30am
Coffee Break

Location: Salon A-C
10:30am – 12:00pm

WB ■ Profiling of $\chi^{(2)}$
Steven R. Brueck, Univ. of New Mexico, Albuquerque, NM, USA.

WB1 10:30am ►INVITED
"The Glamorous" European project (glass-based modulators, routers and switches), *Valerio Pruneri, Corning-OTI, Milan, Italy; F. Lucchi, Corning-OTI, Milan, Italy; M. Belmonte, Corning-OTI, Milan, Italy; Niklas Myrén, Albanova, Stockholm, Sweden; Walter Margulis, Acreo, Stockholm, Sweden; C. Corbari, Univ. of Southampton, Southampton, UK; O. Deparis, Univ. of Southampton, Southampton, UK; P. G. Kazansky, Univ. of Southampton, Southampton, UK; Jacob Fage-Pedersen, Tech. Univ. of Denmark, Kgs. Lyngby, Denmark; Martin Kristensen, Tech. Univ. of Denmark, Kgs. Lyngby, Denmark; Daniel Pastor, Univ. Politécnica de Valencia, Valencia, Spain; Beatriz Ortega, Univ. Politécnica de Valencia, Valencia, Spain; José Capmany, Univ.Politécnica de Valencia, Valencia, Spain; G. Martinelli, Univ. des Sciences et Tech. de Lille 1, Villeneuve d'Ascq Cedex, France; Y. Quiquempois, Univ. des Sciences et Tech. de Lille 1, Villeneuve d'Ascq Cedex, France; A. Kudlinski, Univ. des Sciences et Tech. de Lille 1, Villeneuve d'Ascq Cedex, France; H. Zeghlache, Univ. des Sciences et Tech. de Lille 1, Villeneuve d'Ascq Cedex, France; B. Poumellec, Univ. Paris – Sud, Orsay Cedex, France; Q. Liu, Univ. Paris – Sud, Orsay Cedex, France; R. Blum, Univ. Paris – Sud, Orsay Cedex, France; Monica Ferraris, Politecnico di Torino, Torino, Italy; Yvonne Menke, Politecnico di Torino, Torino, Italy; Laurent Billes, Corvis France R&D, Lannion, France; Christophe Meyer, Corvis France R&D, Lannion, France; Loïg Plouzennec, Corvis France R&D, Lannion, France.*
We will describe the European project Glamorous, which involves several Res. groups working in the field of poling of glass. Objectives and recent results on materials, devices and applications will be reviewed.

WB2 11:00am
Nonlinear distribution reconstruction in poled silica glasses with a sub-micron resolution, *Yves Quiquempois, Univ. of Lille, Villeneuve d'Ascq, France; Mickael Lelek, Univ. of Lille, Villeneuve d'Ascq, France; Alexandre Kudlinski, Univ. of Lille, Villeneuve d'Ascq, France; Hassina Zeghlache, Univ. of Lille, Villeneuve d'Ascq, France; Gilbert Martinelli, Univ. of Lille, Villeneuve d'Ascq, France.*
Thermally poled samples were submitted to a hydrofluoric acid etching. Both the second harmonic signal and the sample thickness were simultaneously recorded. The nonlinear spatial distribution was deduced with a sub-micron resolution

WB3 11:15am
Improved Fourier transform technique to determine second-order optical nonlinearity profiles, *Aydogan Ozcan, E. L. Ginzton Lab., Stanford Univ., Palo Alto, CA, USA; Michel J. F. Digonnet, E. L. Ginzton Lab., Stanford Univ., Palo Alto, CA, USA; Gordon S. Kino, E. L. Ginzton Lab., Stanford Univ., Palo Alto, CA, USA.*
We report a novel Maker-fringe measurement technique to determine uniquely the nonlinearity profile of thin nonlinear materials such as poled silica, which offers a greater accuracy as well as a much simpler and faster data processing algorithm.

WB4 11:30am
An interferometric Maker fringe experiment to reconstruct the $X^{(2)}$ profile of poled silica plates, *Vincent Tréanton, École Polytechnique de Montréal, Montréal, PQ, Canada; Nicolas Godbout, École Polytechnique de Montréal, Montréal, PQ, Canada; Suzanne Lacroix, École Polytechnique de Montréal, Montréal, PQ, Canada.*
An experimental setup is proposed to obtain the phase of the second-harmonic generated signal when performing Maker fringe measurements. This phase information is useful for the reconstruction of $\chi^{(2)}(z)$ profiles.

WB5 11:45am
Comparison of characterization techniques and the effect of surface condition in poled silica, *Isabel C. Carvalho, PUC-Rio, Rio de Janeiro, RJ, Brazil; G. A. Quintero, Pontifícia Univ. Católica, Rio de Janeiro, RJ, Brazil; C. S. Franco, Pontifícia Univ. Católica, Rio de Janeiro, RJ, Brazil; H. R. Carvalho, Pontifícia Univ. Católica, Rio de Janeiro, RJ, Brazil; D. M. González, Pontifícia Univ. Católica, Rio de Janeiro, RJ, Brazil; P. M. Gouvêa, Pontifícia Univ. Católica, Rio de Janeiro, RJ, Brazil; A. L. Triques, Inst. de Estudos Avançados, Centro Técnico Aeroespacial, São José dos Campos, Brazil; B. Lesche, Dept. de Física, Univ. Federal de Juiz de Fora, Juiz de Fora, Brazil; N. Myren, Acreo AB, Stockholm, Sweden; W. Margulis, Acreo AB, Stockholm, Sweden; G. Martinelli, Univ. des Sciences et Tech. de Lille, Lab. de Physique des Lasers, Atomes et Molécules, Villeneuve d'Ascq, France; Y. Quiquempois, Univ. des Sciences et Tech. de Lille, Lab. de Physique des Lasers, Atomes et Molécules, Villeneuve d'Ascq, France; A. Kudlinski, Univ. des Sciences et Tech. de Lille, Lab. de Physique des Lasers, Atomes et Molécules, Villeneuve d'Ascq, France; H. Zeghlache, Univ. des Sciences et Tech. de Lille, Lab. de Physique des Lasers, Atomes et Molécules, Villeneuve d'Ascq, France.*
Four characterization techniques are compared in the measurement of the depletion region of silica poled during different time intervals. The effect of pre-etching the samples prior to poling is also investigated.

12:00pm – 1:30pm
Lunch Break

Location: Salon A-C

1:30pm – 3:00pm

WC ■ Grating Fabrication and Characterization

Pierre-Yves Fonjallaz, Electrum 236, Kista, Sweden.

WC1 1:30pm ►INVITED

Manufacturing of high-channel count dispersion compensators using complex phase masks technology, *Martin Guy, TeraXion, Sainte Foy, PQ, Canada; François Trépanier, TeraXion, Sainte Foy, PQ, Canada; Yves Painchaud, TeraXion, Sainte Foy, PQ, Canada.*
We review the latest developments related to complex phase masks for efficient manufacturing of high-channel count dispersion compensators. Dispersion compensators fabricated using holographic and lithographic complex phase masks are experimentally demonstrated.

WC2 2:00pm

Spatial characterization of strong FBGs using thermal linear chirp and optical frequency domain reflectometry, *Ole Henrik Waagaard, Optoplan AS, Trondheim, Norway; Jon Thomas Kringlebotn, Optoplan AS, Trondheim, Norway; Erik Magnus Bruvik, Optoplan AS, Trondheim, Norway.*
By applying a thermal chirp to a very strong grating with -66 dB minimum transmission, we are able to accurately reconstruct the complex coupling coefficient profile from the measured complex reflection spectrum.

WC3 2:15pm

Application of adiabatic UV correction to multi-channel chirped fiber gratings, *Pavel Ivanoff C. Reyes, OFS Lab., Murray Hill, NJ, USA; Mikhail Sumetsky, OFS Lab., Murray Hill, NJ, USA; Paul S. Westbrook, OFS Lab., Murray Hill, NJ, USA; Natalia M. Litchinitser, OFS Lab., Murray Hill, NJ, USA.*
We demonstrate reduction of group delay ripple from 24 ps to 5 ps peak to peak in a multichannel chirped fiber grating by adiabatic UV post processing.

WC4 2:30pm

Phase-matched concatenation of fibre Bragg gratings using the anti-phase amplitude modulation experienced by the inscription UV beams after diffraction by the gratings, *Laurent Paccou, Univ. de Lille I, Villeneuve d'Ascq, France; Pierre Niay, Univ. de Lille I, Villeneuve d'Ascq, France; Marc Douay, Univ. de Lille I, Villeneuve d'Ascq, France; Isabelle Riant, Alcatel C.I.T R&I, Marcoussis, France; Olivier Durand, Alcatel C.I.T R&I, Marcoussis, France.*
Phase matching of short gratings is demonstrated using the grating-induced diffraction of inscription UV beams. The efficiency of the method was demonstrated by concatenating gratings written in H_2 loaded and unloaded SMF28 fiber.

WC5 2:45pm

Complex apodized holographic phase mask for FBG writing, *Francois Trepanier, TeraXion, Sainte-Foy, PQ, Canada; Michel Poulin, TeraXion, Sainte-Foy, PQ, Canada; Ghislain Bilodeau, TeraXion, Sainte-Foy, PQ, Canada.*
We present holographically made phase masks having complex apodization profile and phase shifts for writing multi-channel FBG for chromatic dispersion compensation.

Location: Salon D-G

3:00pm – 3:30pm

Coffee Break

Location: Salon A-C

3:30pm – 5:00pm

WD ■ Novel Devices and Applications

Jose E. Roman, Ciena Corp., Linthicum, MD, USA.

WD1 3:30pm ►INVITED

Micro-bending induced tunable fiber gratings in single mode fiber, *Henry Lee, UC Irvine, Irvine, CA, USA; Chien-Hung Lin, UC Irvine, Irvine, CA, USA.*
I will review recent progress in the micro-bending induced fiber gratings on cladding engineered and specialty single-mode fibers that leads to a number of novel all-fiber tunable devices for possible applications in dynamic optical networks.

WD2 4:00pm
Dynamically tunable long period grating using two outer gels, *Carlos De Barros, Alcatel R&I, Marcoussis, France; Xavier Bonnet, Alcatel R&I, Marcoussis, France; Valerie Girardon, Alcatel R&I, Marcoussis, France; Jean-Jacques Guerin, Alcatel R&I, Marcoussis, France; Isabelle Riant, Alcatel R&I, Marcoussis, France.*
We report a new principle to independently tune the wavelength and the transmission of a UV-photowritten Long Period Grating. This principle is based on a variable partial immersion of the grating with two optimized outer gels.

WD3 4:15pm
All-fiber mode-locked Pr/Yb-doped upconversion laser, *Marcel Zeller, Swiss Federal Inst. of Tech., Lausanne, Switzerland; Theo Lasser, Swiss Federal Inst. of Tech., Lausanne, Switzerland; Hans G. Limberger, Swiss Federal Inst. of Tech., Lausanne, Switzerland.*
A mode-locked all-fiber laser at 635 nm is demonstrated using upconversion in fluoride fiber, an acousto-optic phase modulator, gratings and adiabatic tapers photo-written in germanosilicate fibers. Stable 90 ps pulses were generated at 158 MHz.

WD4 4:30pm
Experimental demonstration of frequency-encoded optical CDMA using superimposed fiber Bragg gratings, *Julien Magné, Ctr. d'Optique Photonique et Laser (COPL), Dépt. de génie electrique et de génie informatique, Sainte-Foy, PQ, Canada; D.- P. Wei, Dépt. de génie electrique et de génie informatique, Sainte-Foy, PQ, Canada; S. Ayo, Dépt. de génie electrique et de génie informatique, Sainte-Foy, PQ, Canada; L. A. Rusch, Dépt. de génie electrique et de génie informatique, Sainte-Foy, PQ, Canada; S. LaRochelle, Dépt. de génie electrique et de génie informatique, Sainte-Foy, PQ, Canada.*
We propose and demonstrate a novel scheme for frequency-encoded optical code division multiple access (FE-OCDMA). Eight-wavelength superimposed fiber Bragg gratings (SFBGs) are used to encode four channels at 155 Mb/s. Multiple access interference suppression is achieved using M-sequence codes with balanced detection.

WD5 4:45pm
Tunable dispersion compensator based on three distributed Gires-Tournois etalons, *Xuewen Shu, Indigo Photonics Ltd., Birmingham, UK; Karen Chisholm, Indigo Photonics Ltd., Birmingham, UK; John Mitchell, Indigo Photonics Ltd., Birmingham, UK; Ian Felmeri, Indigo Photonics Ltd., Birmingham, UK; Phil Rhead, Indigo Photonics Ltd., Birmingham, UK; Andrew Gillooly, Aston Univ., Birmingham, UK; Kevin Byron, Indigo Photonics Ltd, Birmingham, UK; Kate Sugden, Indigo Photonics Ltd., Birmingham, UK.*
We have demonstrated a c-band operable, low group delay ripple, FBG-based Gires-Tournois etalon dispersion compensator where the dispersion tuning range has been significantly increased by the inclusion of an additional etalon.