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G. Bolognini, Istituto per la Microelettronica e Microsistemi, CNR (Italy); C. Clivati, Istituto Nazionale di Ricerca Metrologica (Italy); G. Costanzo, Politecnico di Torino (Italy); M. Frittelli, F. Levi, A. Mura, Istituto Nazionale di Ricerca Metrologica (Italy); S. Schiller, Heinrich-Heine-Univ. Düsseldorf (Germany); D. Calonico, Istituto Nazionale di Ricerca Metrologica (Italy)
- 9157 25 **Temperature-insensitive strain sensor based on in-line Fabry-Perot interferometer** [9157-368]
Y. Wang, S. Liu, C. Liao, Z. Li, Q. Wang, G. Yin, J. He, B. Sun, J. Zhao, J. Tang, Shenzhen Univ. (China)
- 9157 26 **An all optical fiber frequency reference using digital interferometry** [9157-387]
M. B. Gray, T. G. McRae, National Measurement Institute of Australia (Australia); S. Ngo, D. A. Shaddock, The Australian National Univ. (Australia); M. T. L. Hsu, National Measurement Institute of Australia (Australia)
- 9157 27 **Sensitivity enhancement of Faraday effect based heterodyning fiber laser magnetic field sensor with the assistance of CO₂-laser treatment** [9157-390]
L. Cheng, J. Han, L. Jin, Z. Guo, B.-O. Guan, Jinan Univ. (China)
- 9157 28 **Temperature sensor with enhanced sensitivity by cascaded fiber optic Sagnac loops** [9157-454]
L.-Y. Shao, Y. Luo, Z. Zhang, X. Zou, B. Luo, W. Pan, L. Yan, Southwest Jiaotong Univ. (China)
- 9157 29 **Refractive index insensitive temperature sensor based on hollow annular core fiber Mach-Zehnder interferometer** [9157-477]
Y. Zhang, A. Zhou, Q. Xu, B. Qin, Z. Liu, Harbin Engineering Univ. (China)
- 9157 2A **Ultra-high sensitive temperature sensor based on multimode fiber Mach-Zehnder interferometer** [9157-479]
A. Zhou, Y. Zhang, Y. Yang, J. Yang, Z. Liu, Harbin Engineering Univ. (China)
- 9157 2B **Polarimetric DBR fiber laser sensor for strain-temperature discrimination** [9157-496]
L. Rodriguez-Cobo, M. A. Quintela, I. Laarossi, J. M. Lopez-Higuera, Univ. de Cantabria (Spain)
- 9157 2C **In-line Mach-Zehnder interferometer based on a dissimilar-doping dual-core fiber for high sensitivity strain and temperature sensing** [9157-500]
H. F. Martins, INESC Porto (Portugal) and Univ. do Porto (Portugal); J. Bierlich, K. Wondraczek, S. Unger, J. Kobelke, K. Schuster, Institut für Photonische Technologien e.V. (Germany); M. B. Marques, INESC Porto (Portugal) and Univ. do Porto (Portugal); M. Gonzalez-Herraez, Univ. de Alcalá (Spain); O. Frazão, INESC Porto (Portugal) and Univ. do Porto (Portugal)
- 9157 2D **Interferometric filtering of the excess relative intensity noise of the broadband source of a fiber optic gyroscope** [9157-521]
J. Honthaas, J.-J. Bonnefois, E. Ducloux, H. Lefèvre, iXBlue (France)

- 9157 2E **Influence of spin manufacturing process on properties of the spun single mode fiber** [9157-534]
J. X. Wen, Shanghai Univ. (China); Y. P. Wen, Shanghai Hengtong Photoelectric Technology Co., Ltd. (China); J. Wang, W. J. Liu, Z. Y. Chen, T. Y. Wang, Shanghai Univ. (China); Y. H. Luo, The Univ. of New South Wales (China); G. D. Peng, The Univ. of New South Wales (Australia)
- 9157 2F **Open cavity Fabry-Pérot interferometric refractometer based on C-shaped fiber** [9157-535]
C. Wu, The Hong Kong Polytechnic Univ. (Hong Kong, China) and Jinan Univ. (China); Z. Liu, A. P. Zhang, The Hong Kong Polytechnic Univ. (Hong Kong, China); B.-O. Guan, Jinan Univ. (China); H.-Y. Tam, The Hong Kong Polytechnic Univ. (Hong Kong, China)
- 9157 2G **Optical fiber sensor of partial discharges in High Voltage DC experiments** [9157-579]
I. Búa-Núñez, Univ. Carlos III de Madrid (Spain); C. G. Azcárraga-Ramos, Univ. di Bologna (Italy); J. E. Posada-Román, J. A. Garcia-Souto, Univ. Carlos III de Madrid (Spain)
- 9157 2H **Thermal strain along optical fiber in lightweight composite FOG: Brillouin-based distributed measurement and finite element analysis** [9157-625]
S. Minakuchi, T. Sanada, N. Takeda, The Univ. of Tokyo (Japan); S. Mitani, T. Mizutani, Y. Sasaki, K. Shinozaki, Japan Aerospace Exploration Agency (Japan)
- 9157 2I **Speckle POF sensor for detecting vital signs of patients** [9157-642]
M. Lomer, L. Rodriguez-Cobo, P. Revilla, G. Herrero, F. Madruga, J. M. Lopez-Higuera, Univ. de Cantabria (Spain)
- 9157 2J **Stress-based mechanisms in polymer mPOFs for fibre optic sensing** [9157-667]
G. Durana, O. Arizabalaga, G. Aldabaldetreku, M. A. Illarramendi, J. Zubia, Univ. of the Basque Country (Spain)
- 9157 2K **Ultra-short DBR fiber laser based sensor for arterial pulse monitoring** [9157-636]
Q. Sun, J. Wo, H. Wang, D. Liu, Huazhong Univ. of Science and Technology (China)
- 9157 2L **Fabrication of long period fiber gratings based on embedded-core hollow optical fiber** [9157-209]
C. Guan, X. Zhong, Harbin Engineering Univ. (China); X. Tian, PetroChina Co. (China) and Harbin Engineering Univ. (China); S. Li, L. Yuan, Harbin Engineering Univ. (China)
- 9157 2M **Polarization characteristics of graphene-coated surface core fiber** [9157-222]
S. Li, C. Guan, X. Zhong, Y. Shen, L. Yuan, Harbin Engineering Univ. (China)
- 9157 2N **Advanced fabrication and calibration of high-temperature sensor elements based on sapphire fiber Bragg gratings** [9157-254]
T. Elsmann, T. Habisreuther, M. Rothhardt, R. Willsch, H. Bartelt, Institut für Photonische Technologien e.V. (Germany)
- 9157 2O **Novel sensing concept based on optical Tamm plasmon** [9157-256]
W. L. Zhang, F. Wang, Y. Rao, J. Yao, Univ. of Electronic Science and Technology of China (China)
- 9157 2P **Displacement measurement based on cross-phase modulation of orthogonally polarized sinusoidal optical signals** [9157-262]
C. Baker, X. Bao, Univ. of Ottawa (Canada)

- 9157 2Q **Short cavity active mode locking fiber laser for optical sensing and imaging** [9157-283]
H. D. Lee, G. H. Han, S. W. Jeong, M. Y. Jeong, C.-S. Kim, Pusan National Univ. (Korea, Republic of); J. G. Shin, B. H. Lee, T. J. Eom, Gwangju Institute of Science and Technology (Korea, Republic of)
- 9157 2R **Microstructured fibres ultraviolet sources for sensing applications** [9157-289]
Z. Holdynski, M. Napierala, M. Szymanski, M. Murawski, Military Univ. of Technology (Poland) and InPhoTech Ltd. (Poland); P. Mergo, Maria Curie-Sklodowska Univ. (Poland); P. Marc, L. R. Jaroszewicz, Military Univ. of Technology (Poland); T. Nasilowski, Military Univ. of Technology (Poland) and InPhoTech Ltd. (Poland)
- 9157 2S **Regeneration of tilted fiber Bragg gratings** [9157-310]
R. Cotillard, G. Laffont, P. Ferdinand, Lab. de Mesures Optiques, LIST, CEA (France)
- 9157 2T **First order fiber Bragg grating inscription with femtosecond laser and reflection wavelengths from visible to infrared** [9157-314]
M. Becker, T. Elsmann, A. Schwuchow, M. Rothhardt, S. Dochow, H. Bartelt, Institut für Photonische Technologien e.V. (Germany)
- 9157 2U **Ultrahigh resolution optical spectrometry based on Brillouin dynamic grating** [9157-360]
Y. Dong, T. Jiang, L. Teng, Harbin Institute of Technology (China); H. Zhang, Harbin Univ. of Science and Technology (China); L. Chen, X. Bao, Univ. of Ottawa (Canada); Z. Lu, Harbin Institute of Technology (China)
- 9157 2V **Strain sensitivity enhancement for FBG sensors by all-optical frequency chirp magnification with high-order cascaded FWM** [9157-408]
J. Du, X. Fan, Q. Liu, Z. He, Shanghai Jiao Tong Univ. (China)
- 9157 2W **Highly stable single-wavelength and broadband random fiber lasers** [9157-418]
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- 9157 2X **High-sensitivity fiber optic accelerometer based on multilayer fiber coils** [9157-422]
F. Peng, J. Yang, F. Gao, Harbin Engineering Univ. (China)
- 9157 2Y **Supercontinuum generation in nonlinear fibers using high-energy figure-of-eight mode-locked fiber laser for SD-OCT application** [9157-456]
B. Xu, T. Nagata, S. Yamashita, The Univ. of Tokyo (Japan)
- 9157 2Z **Optical power supply unit utilizing high power laser diode module developed for fiber laser pumping** [9157-502]
A. Sakamoto, W. Kiyoyama, R. Yamauchi, Fujikura Ltd. (Japan)
- 9157 30 **Al-doped optical fiber to enhance strain sensitivity of Brillouin based optical fiber sensors** [9157-480]
Y. Sikali Mamdem, EDF Recherche & Développement (France); F. Taillade, EDF Recherche & Développement (France) and Univ. Paris Est (France); Y. Jaouën, R. Gabet, Télécom ParisTech (France); G. Moreau, EDF Recherche & Développement (France); A. Faustov, SCK CEN (Belgium); G. Pilorget, S. Delepine-Lesoille, ANDRA (France)
- 9157 31 **Temperature characterisation of an optically interrogated Rogowski coil** [9157-481]
G. Fusiek, P. Orr, P. Niewczas, Univ. of Strathclyde (United Kingdom)

- 9157 32 **Multi-core to 7 single-core-fibers fan-out device with multi-core fiber pigtail connector** [9157-501]
K. Omichi, H. Uemura, K. Sasaki, K. Takenaga, R. Goto, S. Matsuo, Fujikura Ltd. (Japan); K. Saïtoh, Hokkaido Univ. (Japan); R. Yamauchi, Fujikura Ltd. (Japan)
- 9157 33 **Single-polarization microfiber and resonator for sensing applications** [9157-520]
F. Xu, J.-H. Chen, Y. Lu, Nanjing Univ. (China)
- 9157 34 **A sub-micron plasmonic nano-resonator refractometer in metal-coated fiber taper** [9157-530]
M. Ding, BeiHang Univ. (China) and Univ. of Southampton (United Kingdom); M. N. Zervas, Univ. of Southampton (United Kingdom); W. Quan, BeiHang Univ. (China); G. Brambilla, Univ. of Southampton (United Kingdom)
- 9157 35 **Six microelectrodes assembly for tunable optical fibers** [9157-543]
S. Ertman, T. R. Woliński, Warsaw Univ. of Technology (Poland)
- 9157 36 **Pulse-compression optical time domain reflectometer** [9157-566]
S. Yang, W. Zou, X. Long, J. Chen, Shanghai Jiao Tong Univ. (China)
- 9157 37 **Performance of digital incoherent OFDR and prospects for optical fiber sensing applications** [9157-575]
S. Liehr, Bundesanstalt für Materialforschung und -prüfung (Germany); N. Nöther, fibrisTerre GmbH (Germany); M. Steffen, Bundesanstalt für Materialforschung und -prüfung (Germany); O. Gili, fibrisTerre GmbH (Germany); K. Krebber, Bundesanstalt für Materialforschung und -prüfung (Germany)
- 9157 38 **Theoretical modeling of a Localized Surface Plasmon Resonance (LSPR) based fiber optic temperature sensor** [9157-590]
J. F. Algorri, B. García-Cámara, Univ. Carlos III de Madrid (Spain); A. García-García, Ciudad Univ. (Spain); V. Urruchi, J. M. Sánchez-Pena, Univ. Carlos III de Madrid (Spain)
- 9157 39 **Optical fiber elements for addressing individual cores in multicore optical fiber sensors** [9157-602]
M. Napierala, M. Murawski, M. Szymanski, L. Ostrowski, Military Univ. of Technology (Poland) and InPhoTech Ltd. (Poland); L. Szostkiewicz, InPhoTech Ltd. (Poland); P. Mergo, Maria Curie-Skłodowska Univ. (Poland); L. Jaroszewicz, Military Univ. of Technology (Poland); T. Nasilowski, Military Univ. of Technology (Poland) and InPhoTech Ltd. (Poland)
- 9157 3A **Evaluation of a 1540nm VCSEL for fibre Bragg gratings interrogation in dynamic measurement applications** [9157-628]
J. A. Garcia-Souto, P. Martin-Mateos, J. E. Posada, P. Acedo, Univ. Carlos III de Madrid (Spain); D. A. Jackson, Univ. Carlos III de Madrid (Spain) and Univ. of Kent (United Kingdom)
- 9157 3B **Remote sensing with nonlinear negative-index metamaterials** [9157-634]
A. K. Popov, Univ. of Wisconsin-Stevens Point (United States) and Birck Nanotechnology Ctr., Purdue Univ. (United States); S. A. Myslivets, L.V. Kirensky Institute of Physics (Russian Federation)

- 9157 3C **Analysis of a fibre optic sensor design based on SPR in nanowire metamaterial films** [9157-650]
I. T. Leite, INESC TEC (Portugal); P. Fernandes, IFIMUP and Institute of Nanoscience and Nanotechnology (Portugal); A. Hierro-Rodriguez, INESC TEC (Portugal) and IFIMUP and Institute of Nanoscience and Nanotechnology (Portugal); J. M. Teixeira, IFIMUP and Institute of Nanoscience and Nanotechnology (Portugal); P. S. Jorge, INESC TEC (Portugal); A. Guerreiro, INESC TEC (Portugal) and Univ. do Porto (Portugal)
- 9157 3D **Analysis of the spectrum distortions of optical fiber Bragg gratings fabricated in-line on a draw tower by the phase mask technique** [9157-657]
Y. Zheng, H. Yu, H. Guo, X. Li, D. Jiang, Wuhan Univ. of Technology (China)
- 9157 3E **Generation of fiber-based plasmonic Airy beam** [9157-208]
C. Guan, Harbin Engineering Univ. (China) and Univ. of Southampton (United Kingdom); M. Ding, J. Shi, Univ. of Southampton (United Kingdom); P. Wang, Harbin Engineering Univ. (China) and Dublin Institute of Technology (Ireland); P. Hua, G. Brambilla, Univ. of Southampton (United Kingdom); L. Yuan, Harbin Engineering Univ. (China)
- 9157 3F **Design of long period fiber grating with optimal sensitivity for detecting adhesion of nano-layer on the fiber surface** [9157-614]
P. Biswas, T. K. Dey, N. Basumallick, P. K. Sinha, K. Dasgupta, S. Bandyopadhyay, Central Glass and Ceramic Research Institute (India)
- 9157 3G **Hydrostatic pressure sensitivity of standard polymer fibre Bragg gratings and etched polymer fibre Bragg gratings** [9157-125]
K. Bhowmik, The Univ. of New South Wales (Australia) and National ICT Australia (Australia); G. Rajan, The Univ. of New South Wales (Australia); E. Ambikairajah, The Univ. of New South Wales (Australia) and National ICT Australia (Australia); G.-D. Peng, The Univ. of New South Wales (Australia)

CHEMICAL, ENVIRONMENTAL, BIOLOGICAL, MEDICAL SENSORS AND BIOPHOTONICS I

- 9157 3H **Exploring the dark continent with fibre Bragg gratings** [9157-212]
J. W. Arkwright, D. H.-C. Wang, S. A. Maunder, N. G. Blenman, Commonwealth Scientific and Industrial Research Organisation (Australia); I. Underhill, Griffith Univ. (Australia); V. Patton, The Univ. of New South Wales (Australia); P. G. Dinning, Flinders Univ. (Australia)
- 9157 3I **Microfluidic device integrated with FBG in Co²⁺-doped fiber to measure flow rate with nL/s sensitivity** [9157-278]
Z. Liu, A. Zhang, H. Tam, The Hong Kong Polytechnic Univ. (Hong Kong, China)
- 9157 3J **Celiac disease biodetection using lossy-mode resonances generated in tapered single-mode optical fibers** [9157-286]
A. B. Socorro, J. M. Corres, I. Del Villar, I. R. Matias, F. J. Arregui, Univ. Pública de Navarra (Spain)
- 9157 3K **Fiber optical beam shaping using polymeric structures** [9157-356]
R. S. Rodrigues Ribeiro, INESC TEC (Portugal) and Univ. do Porto (Portugal); R. B. Queirós, INESC TEC (Portugal); A. Guerreiro, INESC TEC (Portugal) and Univ. do Porto (Portugal); C. Ecoffet, O. Soppera, Institut de Sciences des Matériaux de Mulhouse, CNRS (France); P. S. Jorge, INESC TEC (Portugal)

Part Two

CHEMICAL, ENVIRONMENTAL, BIOLOGICAL, MEDICAL SENSORS AND BIOPHOTONICS II

- 9157 3L **Wide and fast wavelength-swept fiber lasers based on dispersion tuning for real-time OCT (Invited Paper)** [9157-676]
S. Yamashita, Y. Takubo, The Univ. of Tokyo (Japan)
- 9157 3M **High-sensitivity humidity sensors based on TiO₂-coated long period fiber grating for high-energy physics applications** [9157-506]
G. Berruti, Univ. degli Studi del Sannio (Italy) and CERN (Switzerland); M. Consales, Univ. degli Studi del Sannio (Italy); A. Borriello, M. Giordano, Istituto per i Materiali Compositi e Biomedici, CNR (Italy); S. Buontempo, INFN, CNR (Italy); G. Breglio, Univ. degli Studi di Napoli Federico II (Italy); A. Makovec, The Univ. of Debrecen (Hungary); P. Petagna, CERN (Switzerland); A. Cusano, Univ. degli Studi del Sannio (Italy)
- 9157 3N **Photochemistry on soft-glass hollow-core photonic crystal fibre** [9157-527]
A. M. Cubillas, Max-Planck-Institut für die Physik des Lichts (Germany) and Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); X. Jiang, T. G. Euser, Max-Planck-Institut für die Physik des Lichts (Germany); N. Taccardi, B. J. M. Etzold, P. Wasserscheid, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); P. St. J. Russell, Max-Planck-Institut für die Physik des Lichts (Germany) and Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany)
- 9157 3O **Fiber optic sensing system for monitoring of coal waste piles in combustion** [9157-576]
D. Viveiros, INESC Porto (Portugal); J. Ribeiro, Univ. do Porto (Portugal); J. P. Carvalho, J. Ferreira, INESC Porto (Portugal); A. R. Pinto, R. A. Perez-Herrera, S. Diaz, Univ. Pública de Navarra (Spain); A. Lopez-Gil, A. Dominguez-Lopez, O. Esteban, H. F. Martins, S. Martin-Lopez, Univ. de Alcalá (Spain); H. Baierl, J.-L. Auguste, R. Jamier, S. Rougier, XLIM Institut de Recherche, CNRS, Univ. de Limoges (France); J. L. Santos, INESC Porto (Portugal) and Univ. do Porto (Portugal); D. Flores, Univ. do Porto (Portugal); P. Roy, XLIM Institut de Recherche, CNRS, Univ. de Limoges (France); M. González-Herráez, Univ. de Alcalá (Spain); M. López-Amo, Univ. Pública de Navarra (Spain); J. M. Baptista, INESC Porto (Portugal) and Univ. da Madeira (Portugal)
- 9157 3P **High sensitivity methane and ethane detection using low-loss mid-IR hollow-core photonic bandgap fibers** [9157-37]
M. N. Petrovich, A. M. Heidt, N. V. Wheeler, N. K. Baddela, D. J. Richardson, Univ. of Southampton (United Kingdom)

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- 9157 3Q **The intelligent distributed acoustic sensing (Invited Paper)** [9157-677]
T. R. Parker, A. Gillies, S. V. Shatalin, M. Farhadiroushan, Silixa Ltd. (United Kingdom)
- 9157 3R **MilliKelvin resolution in cryogenic temperature distributed fibre sensing based on coherent Rayleigh scattering** [9157-592]
X. Lu, M. A. Soto, L. Thévenaz, Ecole Polytechnique Fédérale de Lausanne (Switzerland)

- 9157 3S **Distributed measurement of intermodal beat length in an elliptic-core two-mode fiber by Brillouin dynamic grating** [9157-404]
Y. H. Kim, K. Y. Song, Chung-Ang Univ. (Korea, Republic of)
- 9157 3T **Distributed optical fibre audible frequency sensor** [9157-93]
A. Masoudi, M. Belal, T. P. Newson, Univ. of Southampton (United Kingdom)
- 9157 3U **Simple method for the elimination of polarization noise in BOTDA using balanced detection of orthogonally polarized Stokes and anti-Stokes probe sidebands** [9157-470]
A. López-Gil, A. Domínguez-López, S. Martín-López, M. González-Herráez, Univ. de Alcalá (Spain)

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- 9157 3V **Distributed strain and temperature sensing based on Brillouin scattering in plastic optical fibers (Invited Paper)** [9157-678]
Y. Mizuno, N. Hayashi, K. Nakamura, Tokyo Institute of Technology (Japan)
- 9157 3W **Discriminative and distributed measurement of temperature and strain with time-division pump-probe-read light generation by single laser diode in simplified BOCDA system** [9157-499]
T. Matsumoto, M. Kishi, K. Hotate, The Univ. of Tokyo (Japan)
- 9157 3X **Bragg gratings in carbon coated optical fibers and their potential sensor applications in harsh environment** [9157-605]
Y. Li, D. J. Kudelko, A. S. Hokansson, D. A. Simoff, A. A. Stolov, J. Ng, J. Mann, OFS Fitel LLC (United States)

POSTER SESSION II

- 9157 3Y **Anomalous refractive index of ultrathin gold nanoparticle film coated on tilted fiber Bragg grating** [9157-7]
W. Zhou, D. J. Mandia, M. B. E. Griffiths, S. T. Barry, J. Albert, Carleton Univ. (Canada)
- 9157 3Z **Ex vivo determination of chewing patterns using FBG and artificial neural networks** [9157-41]
L. Z. Karam, V. Pegorini, Univ. Tecnológica Federal do Paraná (Brazil); C. S. R. Pitta, Instituto Técnica Federal do Paraná (Brazil); T. S. Assmann, R. Cardoso, H. J. Kalinowski, J. C. C. Silva, Univ. Tecnológica Federal do Paraná (Brazil)
- 9157 40 **Fiber optic dual EFPI/FBG for radiofrequency ablation monitoring in liver: ex-vivo experiments** [9157-45]
D. Tosi, Univ. of Limerick (Ireland); E. G. Macchi, G. Braschi, M. Gallati, Univ. degli Studi di Pavia (Italy); A. Cigada, Politecnico di Milano (Italy); S. Rossi, IRCCS Policlinico San Matteo Foundation (Italy); S. Poeggel, G. Leen, E. Lewis, Univ. of Limerick (Ireland)

- 9157 41 **Fiber optic extrinsic Fabry-Perot interferometry pressure sensors for *in-vivo* urodynamic analysis** [9157-67]
S. Poeggel, D. Tosi, Univ. of Limerick (Ireland); F. Fusco, V. Mirone, S. Sannino, L. Lupoli, J. Ippolito, Univ. degli Studi di Napoli Federico II (Italy); G. Leen, E. Lewis, Univ. of Limerick (Ireland)
- 9157 42 **Biofunctionalized microfiber Bragg grating for acid-based sensing** [9157-69]
Y. Ran, Y. Huang, X. Shen, D. Sun, X. Wang, L. Jin, J. Li, B. Guan, Jinan Univ. (China)
- 9157 43 **Optimization and characterization of femtosecond laser inscribed in-fiber microchannels for liquid sensing** [9157-76]
G. C. B. Lee, C. Mou, K. Zhou, K. Sugden, Aston Univ. (United Kingdom)
- 9157 44 **A novel liquid viscosity measuring approach based on optical trapping technology** [9157-77]
Y. Zhang, P. Liang, Z. Liu, J. Lei, E. Zhao, J. Yang, L. Yuan, Harbin Engineering Univ. (China)
- 9157 45 **Comparison of the fiber optic dosimeter and semiconductor dosimeter for use in diagnostic radiology** [9157-85]
W. J. Yoo, S. H. Shin, H. I. Sim, S. Hong, S. G. Kim, J. S. Jang, J. S. Kim, H. S. Jeon, G. W. Kwon, K. W. Jang, Konkuk Univ. (Korea, Republic of); S. Cho, Soongsil Univ. (Korea, Republic of); B. Lee, Konkuk Univ. (Korea, Republic of)
- 9157 46 **Polarimetric fiber grating biosensor for *in-situ* high-sensitive intracellular density measurement** [9157-86]
T. Guo, F. Liu, Y. Liu, Jinan Univ. (China); N.-K. Chen, National United Univ. (Taiwan); B.-O. Guan, Jinan Univ. (China); J. Albert, Carleton Univ. (Canada)
- 9157 47 **Highly sensitive gas sensor based on graphene/microfiber hybrid waveguide with Mach-Zehnder interferometer** [9157-97]
Y. Wu, B. Yao, Y. Cheng, A. Zhang, Y. Gong, Y.-J. Rao, Univ. of Electronic Science and Technology of China (China)
- 9157 48 **Graphene-coated microfiber FBG for highly sensitive gas sensing** [9157-98]
B. Yao, Y. Wu, A. Zhang, Y. Cheng, C. Yu, Y. Gong, Y. Rao, Univ. of Electronic Science and Technology of China (China)
- 9157 49 **Dual-parameter monitoring based on fiber loop mirror assisted reflective long period fiber grating** [9157-104]
J. Yuan, C.-L. Zhao, G. Feng, J. Kang, S. Jin, China Jiliang Univ. (China)
- 9157 4A **Fabrication of a photocurable highly sensitive optical ammonia sensor for aquaculture application** [9157-107]
A. Aziz, N. Hafizah I., M. Norzaliman M. Z., G. Witjaksono, MIMOS Berhad (Malaysia)
- 9157 4B **Discrimination of chemical vapor and temperature using an in-line modal interferometer based on an exterior hole-assisted polarization-maintaining photonic crystal fiber** [9157-123]
M.-S. Yoon, N. Jun, Hanyang Univ. (Korea, Republic of); S. B. Lee, Korea Institute of Science and Technology (Korea, Republic of); Y.-G. Han, Hanyang Univ. (Korea, Republic of)

- 9157 4C **Simultaneous measurement of radiation dose and strain based on an erbium-doped fiber ring laser incorporating a fiber Bragg grating** [9157-124]
Y. B. Shim, Hanyang Univ. (Korea, Republic of); Y. Ji, Korea Institute of Radiological & Medical Science (Korea, Republic of); Y.-G. Han, Hanyang Univ. (Korea, Republic of)
- 9157 4D **Adiabatic tapered optical fiber fabrication for exciting whispering gallery modes in microcavities** [9157-131]
Z. Chenari, H. Latifi, R. S. Hashemi, F. Doroudmand, Shahid Beheshti Univ. (Iran, Islamic Republic of)
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A. Minardo, Seconda Univ degli Studi di Napoli (Italy); R. Bernini, Istituto per il Rilevamento Elettromagnetico dell'Ambiente, CNR (Italy); L. Zeni, Seconda Univ degli Studi di Napoli (Italy)
- 9157 6W **Novel technique for distributed fibre sensing based on faint long gratings (FLOGs)** [9157-601]
L. Thévenaz, S. Chin, Ecole Polytechnique Fédérale de Lausanne (Switzerland); J. Sancho, S. Sales, Univ. Politècnica de València (Spain)

- 9157 6X **High sampling rate multi-pulse phase-sensitive OTDR employing frequency division multiplexing** [9157-635]
Z. Pan, Shanghai Institute of Optics and Fine Mechanics (China); Z. Wang, Shanghai Institute of Optics and Fine Mechanics (China) and Univ. of Chinese Academy of Sciences (China); Q. Ye, H. Cai, R. Qu, Z. Fang, Shanghai Institute of Optics and Fine Mechanics (China)
- 9157 6Y **Fast distributed temperature sensing using Brillouin beat spectrum of large effective area fiber (LEAF)** [9157-639]
S. M. Haneef, P. PP, B. S., D. Venkitesh, B. Srinivasan, Indian Institute of Technology Madras (India)
- 9157 6Z **Distributed detection and localization of multiple dynamic perturbations using coherent correlation OTDR** [9157-654]
M. G. Shlyagin, A. Arias, Ctr. de Investigación Científica y de Educación Superior de Ensenada (Mexico); R. Martinez Manuel, Univ. of Johannesburg (South Africa)

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- 9157 70 **Brillouin dynamic grating time-domain slope-assisted fast and distributed strain sensing** [9157-313]
A. Bergman, L. Yaron, T. Langer, M. Tur, Tel-Aviv Univ. (Israel)
- 9157 71 **Mapping the refractive index changes along Yb-doped fibers pumped at 976nm based on acousto-optic interaction** [9157-462]
E. P. Alcusa-Sáez, A. Díez, M. V. Andrés, Univ. de València (Spain)
- 9157 72 **Source-induced noise in stimulated Brillouin scattering** [9157-472]
O. Shlomovits, T. Langer, M. Tur, Tel-Aviv Univ. (Israel)
- 9157 73 **A novel refractive index sensor based on an induced micro-structure fiber** [9157-227]
G.-R. Lin, M. D. Baiad, M. Gagne, Ecole Polytechnique de Montréal (Canada); W.-F. Liu, Feng-Chia Univ. (Taiwan); R. Kashyap, Ecole Polytechnique de Montréal (Canada)

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- 9157 74 **Hybrid fibers: a base for creating new sensing fibers (Invited Paper)** [9157-680]
M. A. Schmidt, Max Planck Institute for the Science of Light (Germany)
- 9157 75 **Bend-insensitive fiber based vibration sensor** [9157-275]
Y. Xu, P. Lu, F. Baset, V. R. Bhardwaj, X. Bao, Univ. of Ottawa (Canada)
- 9157 76 **Highly birefringent suspended core photonic microcells for sensing applications** [9157-335]
C. Wang, W. Jin, W. Jin, J. Ma, H. L. Ho, The Hong Kong Polytechnic Univ. (Hong Kong, China)

- 9157 77 **Microstructured optical fiber Bragg grating-based strain and temperature sensing in the concrete buffer of the Belgian supercontainer concept** [9157-343]
T. Geernaert, S. Sulejmani, C. Sonnenfeld, Vrije Univ. Brussel (Belgium); G. Luyckx, Univ. Gent (Belgium); K. Chah, Univ. de Mons (Belgium); L. Areias, Vrije Univ. Brussel (Belgium) and EIG EURIDICE (Belgium); P. Mergo, Marie Curie-Sklodowska Univ. (Poland); W. Urbanczyk, Wroclaw Univ. of Technology (Poland); P. Van Marcke, E. Coppens, ONDRAF/NIRAS (Belgium); H. Thienpont, F. Berghmans, Vrije Univ. Brussel (Belgium)
- 9157 78 **Tunable phase-shifted FBG based on an in-grating bubble** [9157-396]
C. Liao, Shenzhen Univ. (China); L. Xu, Shenzhen Institute of Information Technology (China); Y. Wang, Shenzhen Univ. (China); D. N. Wang, The Hong Kong Polytechnic Univ. (Hong Kong, China); Q. Wang, Z. Li, X. Zhong, J. Zhou, Y. Liu, Shenzhen Univ. (China)

Part Three

SENSOR APPLICATION AND FIELD TESTS I

- 9157 79 **Precise sensing utilizing optical fiber for space craft (Invited Paper)** [9157-681]
T. Mizutani, Japan Aerospace Exploration Agency (Japan)
- 9157 7A **Field test for real-time position and speed monitoring of trains using phase-sensitive optical time domain reflectometry (Φ -OTDR)** [9157-258]
N. Duan, F. Peng, Y.-J. Rao, J. Du, Y. Lin, Univ. of Electronic Science and Technology of China (China)
- 9157 7B **Glue-induced birefringence in surface-attached FBG strain sensors** [9157-323]
D. Helminger, A. Daitche, J. Roths, Hochschule für Angewandte Wissenschaften München (Germany)
- 9157 7C **Birefringence upper limit analysis of low birefringence fibers employed in the Faraday effect current sensors** [9157-333]
N. Vukovic, M. Segura Sarmiento, T. May-Smith, W. H. Loh, M. N. Zervas, Univ. of Southampton (United Kingdom)
- 9157 7D **Signal-to-noise ratio evaluation with draw tower fibre Bragg gratings (DTGs) for dynamic strain sensing at elevated temperatures and corrosive environment** [9157-453]
B. De Pauw, Vrije Univ. Brussel (Belgium) and SCK CEN (Belgium); A. Lamberti, S. Vanlanduit, Vrije Univ. Brussel (Belgium); K. Van Tichelen, SCK CEN (Belgium); T. Geernaert, F. Berghmans, Vrije Univ. Brussel (Belgium)

SENSOR APPLICATION AND FIELD TESTS II

- 9157 7E **Fiber optic system for the real time detection, localization, and classification of damage in composite aircraft structures (Invited Paper)** [9157-682]
E. Mendoza, J. Prohaska, C. Kempen, Y. Esterkin, S. Sun, Redondo Optics, Inc. (United States); S. Krishnaswamy, Northwestern Univ. (United States)

- 9157 7F **Regeneration experiments with fibre Bragg gratings in hydrogen out-diffused fibres** [9157-497]
L. Polz, A. Dörfler, Hochschule für Angewandte Wissenschaften München (Germany);
H. Bartelt, Institut für Photonische Technologien e.V. (Germany); J. Roths, Hochschule für
Angewandte Wissenschaften München (Germany)
- 9157 7G **Femtosecond laser aided processing of optical sensor fibers for 3D medical navigation and tracking (FiberNavi)** [9157-540]
C. Waltermann, J. Koch, M. Angelmahr, W. Schade, M. Witte, Fraunhofer-Institut für
Nachrichtentechnik Heinrich-Hertz-Institut (Germany); N. Kohn, D. Wilhelm, A. Schneider,
S. Reiser, H. Feussner, Technische Univ. München (Germany)

POSTER SESSION III

- 9157 7H **Optical loading sensor based on single polarization fiber laser incorporating an intra-cavity 45°-TFG** [9157-92]
Z. Sun, C. Mou, Z. Yan, Aston Univ. (United Kingdom); X. Wang, Aston Univ. (United
Kingdom) and Nanjing Univ. (United Kingdom); L. Zhang, Aston Univ. (United Kingdom)
- 9157 7I **Highly focused conical optical field for Pico-Newton scale force sensing** [9157-128]
H. Deng, L. Yuan, Harbin Engineering Univ. (China)
- 9157 7J **Dual-optical-response photonic crystal fibre interferometer for multi-parameter sensing** [9157-144]
J. Villatoro, Univ. del País Vasco (Spain) and IKERBASQUE (Spain); V. P. Minkovich, Ctr. de
Investigaciones en Óptica, A.C. (Mexico); J. Zubia, Univ. del País Vasco (Spain)
- 9157 7K **Absolute strain measurement based on a microfiber Mach-Zehnder interferometer** [9157-151]
S.-J. Kim, M.-S. Yoon, S. Kim, O.-J. Kwon, Y.-G. Han, Hanyang Univ. (Korea, Republic of)
- 9157 7L **Dual-environment pressure sensor using a photonic-crystal fiber** [9157-180]
J. H. Osório, J. G. Hayashi, Y. A. V. Espinel, Univ. Estadual de Campinas (Brazil);
M. A. R. Franco, Instituto de Estudos Avançados (Brazil); M. V. Andrés, Univ. de València
(Spain); C. M. B. Cordeiro, Univ. Estadual de Campinas (Brazil)
- 9157 7M **Phase sensitivity of hollow-core photonic bandgap fiber to internal gas pressure** [9157-198]
Y. Cao, F. Yang, H. L. Ho, W. Jin, The Hong Kong Polytechnic Univ. (Hong Kong, China)
- 9157 7N **Long period gratings in highly birefringent microfibers** [9157-200]
W. Jin, H. Xuan, W. Jin, The Hong Kong Polytechnic Univ. (Hong Kong, China)
- 9157 7O **Characterization of a hybrid Fabry-Perot Cavity based on a four-bridge double-Y-shape-core microstructured fiber** [9157-219]
A. M. R. Pinto, A. Lopez-Aldaba, M. Lopez-Amo, Univ. Pública de Navarra (Spain);
O. Frazao, J. L. Santos, INESC Porto (Portugal); J. M. Baptista, INESC Porto (Portugal) and
Univ. da Madeira (Portugal); H. Baierl, J.-L. Auguste, R. Jamier, P. Roy, XLIM, CNRS, Univ. de
Limoges (France)

- 9157 7P **Microstructured optical fiber Bragg grating-based shear stress sensing in adhesive bonds** [9157-221]
S. Sulejmani, C. Sonnenfeld, T. Geernaert, Vrije Univ. Brussel (Belgium); G. Luyckx, Univ. Gent (Belgium); D. Van Hemelrijck, Vrije Univ. Brussel (Belgium); P. Mergo, K. Skorupski, Marie Curie-Sklodowska Univ. (Poland); W. Urbanczyk, Wroclaw Univ. of Technology (Poland); K. Chah, Univ. de Mons (Belgium); H. Thienpont, F. Berghmans, Vrije Univ. Brussel (Belgium)
- 9157 7Q **All-fiber loading sensor based on 45° and 81° tilted fiber gratings** [9157-231]
Z. Sun, Z. Yan, C. Mou, Aston Univ. (United Kingdom); X. Wang, Aston Univ. (United Kingdom) and Nanjing Univ. (China); J. Li, Aston Univ. (China) and Univ. of Electronic Science and Technology of China (China); L. Zhang, Aston Univ. (United Kingdom)
- 9157 7R **Hollow-core photonic bandgap fiber gas sensor with high sensitivity and fast response** [9157-236]
F. Yang, W. Jin, Y. Cao, H. Ho, The Hong Kong Polytechnic Univ. (Hong Kong, China)
- 9157 7S **Sensitivity improvements of exposed-core microstructured optical fibre Bragg grating refractive index sensors** [9157-240]
S. C. Warren-Smith, T. M. Monro, The Univ. of Adelaide (Australia)
- 9157 7T **Optical fiber Fabry-Pérot sensor fabrication based on focused ion beam post-processing** [9157-249]
R. M. Andre, INESC Porto (Portugal), Univ. do Porto (Portugal), and Institut für Photonische Technologien e.V. (Germany); S. Pevec, Univ. of Maribor (Slovenia); M. Becker, J. Dellith, M. Rothhardt, Institut für Photonische Technologien e.V. (Germany); M. B. Marques, INESC Porto (Portugal) and Univ. do Porto (Portugal); D. Donlagic, Univ. of Maribor (Slovenia); H. Bartelt, Institut für Photonische Technologien e.V. (Germany); O. Frazão, INESC Porto (Portugal) and Univ. do Porto (Portugal)
- 9157 7U **Microtips at photonic crystal fibers as functional elements for near-field scanning optical microscopy probes** [9157-251]
P. Pura, Military Univ. of Technology (Poland); M. Szymański, Military Univ. of Technology (Poland) and InPhoTech Ltd. (Poland); L. R. Jaroszewicz, P. Marć, Military Univ. of Technology (Poland); M. Dudek, M. Kujawińska, Warsaw Univ. of Technology (Poland); M. Napierała, T. Nasiłowski, Ł. Ostrowski, Military Univ. of Technology (Poland) and InPhoTech Ltd. (Poland)
- 9157 7V **D-shape optical fiber refractometer based on TM and TE lossy mode resonances** [9157-263]
P. Zubiarte, C. R. Zamarréño, I. Del Villar, I. R. Matias, F. J. Arregui, Univ. Pública de Navarra (Spain)
- 9157 7W **In-fiber integrated microfluidic sensor based on optical fiber with suspended core** [9157-276]
T. Yuan, X. Yang, Harbin Engineering Univ. (China); P. Teng, Harbin First Machinery Manufacturing Group Co. Ltd. (China); C. Liu, E. Li, E. Zhao, L. Yuan, Harbin Engineering Univ. (China)
- 9157 7X **Improved arc discharge technique for inscribing compact long period fiber gratings** [9157-291]
G. Yin, Y. Wang, C. Liao, J. Zhou, X. Zhong, S. Liu, Q. Wang, Z. Li, B. Sun, J. He, G. Wang, Shenzhen Univ. (China)

- 9157 7Y **Carbon-nanotube-deposited photonic crystal fiber for refractive index sensing** [9157-294]
Y. C. Tan, Z. Q. Tou, V. Mamidala, K. K. Chow, C. C. Chan, Nanyang Technological Univ. (Singapore)
- 9157 7Z **Magnetic field tunability of square tapered no-core fibers** [9157-302]
Y. Miao, J. Wu, Tianjin Univ. of Technology (China); W. Lin, Nankai Univ. (China); K. Zhang, Tianjin Univ. of Technology (China); B. Song, H. Zhang, B. Liu, Nankai Univ. (China)
- 9157 80 **Micro Fabry-Perot interferometer based on suspended core created by etching microstructure fiber** [9157-306]
R. Wang, X. Qiao, Northwest Univ. (China)
- 9157 81 **A fiber tip refractive index sensor using FIB-milled gold-coated singlemode-multimode-singlemode structure** [9157-346]
M. Ding, BeiHang Univ. (China) and Univ. of Southampton (United Kingdom); P. Wang, Dublin Institute of Technology (Ireland); J. Wang, Beijing Aerospace Times Optical-Electronic Technology Co. (China); H. Yuan, Beihang Univ. (China); G. Brambilla, Univ. of Southampton (United Kingdom)
- 9157 82 **Extruded single ring hollow core optical fibers for Raman sensing** [9157-361]
G. Tsiminis, K. J. Rowland, H. Ebendorff-Heidepriem, The Univ. of Adelaide (Australia); N. A. Spooner, The Univ. of Adelaide (Australia) and Defence Science and Technology Organisation (Australia); T. M. Monro, The Univ. of Adelaide (Australia)
- 9157 83 **Microstructure-FBG hybrid load cell** [9157-369]
R. Fiorin, Faculdades Integradas do Brasil (Brazil); L. N. da Costa, I. Abe, V. de Oliveira, A. Lohmann, H. J. Kalinowski, Univ. Tecnológica Federal do Paraná (Brazil)
- 9157 84 **Explosives sensing based on suspended core fiber coated with conjugated polymer** [9157-370]
F. Chu, Shanghai Univ. of Electric Power (China); G. Tsiminis, The Univ. of Adelaide (Australia); N. A. Spooner, The Univ. of Adelaide (Australia) and Defence Science and Technology Organisation (Australia); T. M. Monro, The Univ. of Adelaide (Australia)
- 9157 85 **Photonic crystal fiber based modal interferometer for refractive index sensing** [9157-395]
M. Deng, X. Sun, W. Huang, Chongqing Univ. (China); H. Wei, J. Li, Yangtze Optical Fibre and Cable Co., Ltd. (China)
- 9157 86 **Highly sensitive refractive index sensor based on two cascaded microfiber knots with Vernier effect** [9157-417]
Z. Xu, Q. Sun, W. Jia, Huazhong Univ. of Science and Technology (China); P. P. Shum, Huazhong Univ. of Science and Technology (China) and Nanyang Technological Univ. (Singapore); D. Liu, Huazhong Univ. of Science and Technology (China)
- 9157 87 **Highly sensitive temperature sensor based on D-shaped microfiber with high birefringence** [9157-419]
H. Luo, Q. Sun, Z. Xu, W. Jia, D. Liu, Huazhong Univ. of Science and Technology (China)
- 9157 88 **Functionalization of exposed core fibers with multiligand binding molecules for fluorescence based ion sensing** [9157-430]
R. Kostecki, S. Heng, H. Ebendorff-Heidepriem, A. D. Abell, T. M. Monro, The Univ. of Adelaide (Australia)

- 9157 89 **Hollow-core fiber based linear cavity ring-down spectroscopy for gaseous oxygen detection** [9157-434]
D. Munzke, M. Böhm, O. Reich, Univ. of Potsdam (Germany)
- 9157 8A **Sensing characteristics of long period gratings in hollow core fiber fabricated via electrode arc discharge** [9157-471]
A. Iadicicco, Univ. degli Studi di Napoli Parthenope (Italy); A. Cutolo, Univ. degli Studi del Sannio (Italy); S. Campopiano, Univ. degli Studi di Napoli Parthenope (Italy)
- 9157 8B **Measurement of temperature profile in fiber Bragg gratings using whispering gallery modes** [9157-504]
M. Delgado-Pinar, I. L. Villegas, A. Díez, J. L. Cruz, M. V. Andrés, Univ. de València (Spain)
- 9157 8C **Novel fiber Bragg grating sensor implemented in a polymer-core/silica-cladding hybrid optical fiber** [9157-505]
Z. Yan, H. Khashi, K. Zhou, L. Zhang, Aston Univ. (United Kingdom)
- 9157 8D **Relative humidity optical fiber sensors** [9157-524]
H.-B. Ni, M. Wang, W. Chen, Nanjing Normal Univ. (China)
- 9157 8E **Sensitive surface plasmon resonance biosensor enhanced by photonic-crystal metallic structure** [9157-533]
F. Wang, C. Chen, J. Fang, S. Peng, J. H. Yu, J. Zhang, J. Tang, H. Lu, Z. Chen, Y. Luo, Jinan Univ. (China)
- 9157 8F **A photonic crystal fibre tip refractometer based on multimode interference** [9157-537]
P. Wang, Dublin Institute of Technology (Ireland); M. Ding, Univ. of Southampton (United Kingdom); L. Bo, Y. Semenova, Dublin Institute of Technology (Ireland); G. Brambilla, Univ. of Southampton (United Kingdom); G. Farrell, Dublin Institute of Technology (Ireland)
- 9157 8G **Violet laser power sensor based on micro-fiber coated with methyl blue-functionalized reduced graphene oxide** [9157-538]
Z. Tian, J. Zhang, B. Yang, J. Yu, Z. Chen, J. Tang, Y. Luo, X. Cai, S. Tan, H. Lu, Jinan Univ. (China)
- 9157 8H **In-line photonic crystal fiber optofluidic refractometer** [9157-539]
C. Wu, Jinan Univ. (China); M.-L. V. Tse, Z. Liu, A. P. Zhang, The Hong Kong Polytechnic Univ. (Hong Kong, China); B.-O. Guan, Jinan Univ. (China); H.-Y. Tam, The Hong Kong Polytechnic Univ. (Hong Kong, China)
- 9157 8I **Radiation hardening of FBG in harsh environments** [9157-541]
A. Morana, Lab. Hubert Curien, CNRS, Univ. Jean Monnet (France) and Univ. degli studi di Palermo (Italy); S. Girard, Lab. Hubert Curien, CNRS, Univ. Jean Monnet (France); E. Marin, Lab. Hubert Curie, CNRS, Univ. Jean Monnet (France); C. Marcandella, CEA (France); J. Périsse, J. R. Macé, AREVA (France); A. Boukenter, Lab. Hubert Curien, CNRS, Univ. Jean Monnet (France); M. Cannas, Univ. degli Studi di Palermo (Italy); Y. Ouerdane, Lab. Hubert Curien, CNRS, Univ. Jean Monnet (France)

- 9157 8J **Label-free biosensor based on a dual-core transversally chirped microstructured optical fiber** [9157-552]
E. Reyes-Vera, N. Gómez-Cardona, Instituto Tecnológico Metropolitano (Colombia) and Univ. Nacional de Colombia Sede Medellín (Colombia); P. Torres, Univ. Nacional de Colombia Sede Medellín (Colombia)
- 9157 8K **Micro-electrodes system for electric field sensing with photonic liquid crystal fibers** [9157-580]
T. R. Woliński, M. Tefelska, S. Ertman, K. Mileńko, R. Łączkowski, A. Siarkowska, A. W. Domański, Warsaw Univ. of Technology (Poland)
- 9157 8L **High temperature sensor based on an in-fibre Fabry-Perot cavity** [9157-584]
O. Schneller, Heriot-Watt Univ. (United Kingdom) and Hochschule für Angewandte Wissenschaften München (Germany); J. Mathew, W. N. MacPherson, R. R. J. Maier, Heriot-Watt Univ. (United Kingdom)
- 9157 8M **Analysis of the air holes' geometry influence on longitudinal strain sensitivity of microstructured fiber Bragg gratings** [9157-585]
T. Tenderenda, K. Stepien, Military Univ. of Technology (Poland) and InPhoTech Ltd. (Poland); L. Szostkiewicz, InPhoTech Ltd. (Poland); M. Murawski, M. Szymanski, Military Univ. of Technology (Poland) and InPhoTech Ltd. (Poland); M. Becker, M. Rothhardt, H. Bartelt, Institut für Photonische Technologien e.V. (Germany); P. Mergo, K. Poturaj, K. Skorupski, Maria Curie-Sklodowska Univ. (Poland); P. Marć, L. R. Jaroszewicz, Military Univ. of Technology (Poland); T. Nasilowski, Military Univ. of Technology (Poland) and InPhoTech Ltd. (Poland)
- 9157 8N **Study of whispering gallery modes in a cylindrical microresonator excited by a tilted fiber taper** [9157-587]
V. Kavungal, L. Bo, Q. Wu, Dublin Institute of Technology (Ireland); M. Teng, C. Yu, Beijing Univ. of Posts and Telecommunications (China); G. Farrell, Y. Semenova, Dublin Institute of Technology (Ireland)
- 9157 8O **Delamination-diagnosis-method for adhesively surface-applied FBG strain sensors** [9157-604]
E. Baitinger, V. Schukar, N. Kusche, C. Schilder, Bundesanstalt für Materialforschung und -prüfung (Germany)
- 9157 8P **Improvement in refractive index sensitivity by means of internally curved long period fiber gratings** [9157-615]
F. Chiavaioli, C. Trono, F. Baldini, Istituto di Fisica Applicata Nello Carrara (Italy)
- 9157 8Q **Optical fiber hydrogen sensor based on polarization-maintaining photonic crystal fiber** [9157-624]
Y. Yang, F. Yang, H. Wang, X. Diao, Q. Liu, BeiHang Univ. (China)
- 9157 8R **Multiwavelength fiber lasers based on spatial mode beating for high resolution linear and angular displacement sensing** [9157-631]
N. K. Chen, Y.-H. Chang, National United Univ. (Taiwan); W.-H. Cheng, National Sun Yat-Sen Univ. (Taiwan); T.-H. Guo, B.-O. Guan, Jinan Univ. (China)

- 9157 8S **Optical fiber current transducer using lossy mode resonances for high voltage networks** [9157-568]
J. Ascorbe, J. M. Corres, I. R. Matias, F. J. Arregui, Univ. Pública de Navarra (Spain)
- 9157 8T **Microfiber coupler based biosensor incorporating a layer of gold nanoparticles with improved sensitivity** [9157-595]
Y. Semenova, L. Bo, P. Wang, F. Tian, H. Byrne, G. Farrell, Dublin Institute of Technology (Ireland)
- 9157 8U **Optical fiber Bragg grating mesh for multiphase flow sensing** [9157-671]
C. R. Zamarreño, Univ. Pública de Navarra (Spain); C. Martelli, V. H. V. Baroncini, E. N. dos Santos, M. J. da Silva, R. E. M. Morales, Univ. Tecnológica Federal do Paraná (Brazil); I. R. Matias, F. J. Arregui, Univ. Pública de Navarra (Spain)
- 9157 8V **Application of fiber Bragg grating sensors in light aircraft: ground and flight test** [9157-8]
J.-H. Kim, P. Shrestha, Y. Park, C.-G. Kim, KAIST (Korea, Republic of)
- 9157 8W **An oil and gas pipeline pre-warning system based on Φ -OTDR** [9157-14]
D. Tan, China Univ. of Petroleum-Beijing (China) and China National Petroleum Corp. (China); X. Tian, W. Sun, Y. Zhou, L. Liu, Y. Ma, J. Meng, China National Petroleum Corp. (China); H. Zhang, China Univ. of Petroleum-Beijing (China)
- 9157 8X **Fiber optical magnetic field sensor for power generator monitoring** [9157-31]
M. Willsch, T. Bosselmann, M. Villnow, Siemens AG (Germany)
- 9157 8Y **Raman distributed temperature sensor for oil leakage detection in soil: a field trial and future trends** [9157-39]
A. Signorini, T. Nannipieri, Scuola Superiore Sant'Anna (Italy); L. Gabella, Photonic Networks National Lab. (Italy); F. Di Pasquale, Scuola Superiore Sant'Anna (Italy); G. Latini, D. Ripari, Saipem S.p.A. (Italy)
- 9157 8Z **Fiber optic sensor for methanol quantification in biodiesel** [9157-54]
M. S. Kawano, R. Kamikawachi, J. L. Fabris, M. Müller, Univ. Tecnológica Federal do Paraná (Brazil)
- 9157 90 **Field test of a fully distributed fiber optic intrusion detection system for long-distance security monitoring of national borderline** [9157-100]
H. Wu, Z. Wang, F. Peng, Z. Peng, X. Li, Y. Wu, Y. Rao, Univ. of Electronic Science and Technology of China (China)
- 9157 91 **Optical fiber Fabry-Perot pressure sensor based on SU-8** [9157-106]
J. Zhu, L. Dai, M. Wang, D. Cai, H. Rong, S. Jia, J. You, Nanjing Normal Univ. (China)
- 9157 92 **In-service communication channel sensing based on reflectometry for TWDM-PON systems** [9157-129]
D. Iida, S. Kuwano, J. Terada, NTT Access Network Service Systems Labs. (Japan)
- 9157 93 **Refractive index and viscosity: dual sensing with plastic fibre gratings** [9157-154]
R. Ferreira, Univ. de Aveiro (Portugal); L. Bilro, C. Marques, R. Oliveira, R. Nogueira, Instituto de Telecomunicações (Portugal)

- 9157 94 **Production and characterization of Bragg gratings in polymer optical fibers for sensors and optical communications** [9157-176]
R. Oliveira, C. F. Marques, L. Bilro, R. N. Nogueira, Instituto de Telecomunicações (Portugal)
- 9157 95 **Noncontact photoacoustic tomography using optical fiber-based heterodyne interferometer** [9157-194]
J. Eom, S. J. Park, Y. H. Kim, Gwangju Institute of Science and Technology (Korea, Republic of); C. S. Lee, The Univ. of Suwon (Korea, Republic of); B. H. Lee, Gwangju Institute of Science and Technology (Korea, Republic of)
- 9157 96 **Investigation of low-cost two-wavelength interrogation for integration of different fiber optical temperature sensors into electric power facility monitoring systems** [9157-297]
M. Willsch, J. Kaiser, T. Bosselmann, Siemens AG (Germany); T. Wieduwilt, R. Willsch, Institut für Photonische Technologien e.V. (Germany)
- 9157 97 **FBG system for temperature monitoring under electromagnetic immersed and harsh oil and gas reservoir environment** [9157-319]
M. Villnow, T. Bosselmann, M. Willsch, J. Kaiser, Siemens AG (Germany)
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Introduction

The International Conference on Optical Fibre Sensors (OFS) was first held in London, in 1983. Since then, it has become established as the leading forum for the delivery of new research in optical fibre and guided-wave-based optical systems for sensing, instrumentation and imaging, as well as their applications in physical, chemical and biological measurement. Nowadays OFS is acknowledged as the world's leading interdisciplinary conference on all topics related to photonic sensing with an emphasis on those enabled by optical waveguides and especially by optical fibres.

OFS provides a vibrant forum for reporting the latest advances in fibre-optic and photonic sensing technologies and related devices. The conference has also fostered the exchange of knowledge and ideas within the research and industrial communities. The conference series is held every eighteen months, in rotation between the Americas, Europe, and Asia and the Pacific.

In 2014, OFS will be held in Spain for the first time. OFS23 will be held from Monday to Friday, 2–6 June, in Santander, Cantabria. The conference has now passed three decades and shows every sign of continuing to grow in importance and popularity.

The OFS community is exceptionally heterogeneous. It is not 'owned' by a particular scientific or engineering society, but is stewarded by its own International Steering Committee. Conference participants are highly diverse, and come from a wide range of disciplines in physical sciences and engineering and, to an increasing extent, from life sciences as well. Perhaps it is, above all, the intrinsic interdisciplinarity that keeps the Conference relevant and attractive to many around the world. After all, none of the really important global problems today have solutions lying within a single academic discipline; therefore, we believe that the OFS community is uniquely positioned to contribute to their understanding and definition of viable and sustainable solutions.

Prof. Alan Rogers has been a leading figure in our subject since its inception, and his recent death is a sad loss to the community. OFS23 will recognise his generous and outstanding contributions in a special session (Tribute to Alan Rogers) and by naming one of the Best Student Paper Awards after him: the Alan Rogers Best Student Paper Award on distributed sensors and sensor networks.

A glance at the programme for OFS23 emphatically confirms the reality of the increasing need for more sophisticated sensors and larger sensing networks to address the world's most topical and pervasive problems: of energy, environment, sustainability and health. The programme of the Conference shows the optical sensing community's commitment to tackling such challenges, including examples such as the generation and distribution of electrical energy, energy storage and

energy efficiency, monitoring of environments whether natural or engineered, transport infrastructures and manufacturing. Also, exciting progress is evident at the interface between physical sciences and the life sciences: where optical fibre sensors are becoming an essential component of the new subject of biophotonics—that is becoming established as an invaluable tool for R&D in biochemistry and medicine.

OFS sustains its position at the leading edge of its subject; it continues to evolve to incorporate new science, novel concepts and technologies, advanced techniques and methodologies, combined to achieve more effective, efficient, and economical sensing based on light. This conference series has undergone considerable evolution and healthy growth over the years, reaching now its 23rd occasion, which can already be considered a success in respect of the number of submitted contributions (535), an absolute record in the history of the Conference.

During OFS23, a total of 401 papers will be presented and discussed, 68 in oral and 333 in poster format. After a first review process (with 4 reviews per paper) 375 high quality papers from 35 countries have been accepted. In addition, another six postdeadline papers will be accepted for presentation at OFS23 in a second review process. It must be also remarked that the Conference attendees will have the opportunity to enjoy 20 invited presentations from worldwide leading researchers, with 3 of them as plenary talks of one hour each, delivered by highly renowned scientists from leading Institutions.

OFS is only ever as good as the quality of the papers presented, and we are grateful to all of our authors for their excellent contributions. Moreover, we would particularly like to thank our Technical Programme Committee, which has undertaken the onerous task of carefully reading and assessing all the submissions, and has been consistently diligent and reliable in providing the advice on which the programme has been built. Also to be recognised is that in OFS23, due to the large number of submissions received, the contribution of many members of the International Steering Committee and International Honorary Committee has been crucial to ensure a full review of all submissions: thus satisfying the general OFS23 principle of a minimum of four reviewers per paper. This was indeed a collective endeavour that we deeply appreciate and acknowledge.

OFS23 has been organized during a period of deep economic crisis in Europe with strong impact in Spain, making the many challenges of organising a large complex international conference even more acute. Within this context, we are especially appreciative of the support of companies and institutions that have generously sponsored the Conference, representing a key contribution enabling us to achieve the high quality to which we have aspired for OFS23. Thank you!

We are grateful to all staff of the conference office for their hard work and enthusiasm, in particular we would like to thank Jesus Mirapeix, Ana Maria Ruiz, and

Jose Valdiande at the Photonics Engineering Group and the SPIE staff for their effective and indefatigable dedication.

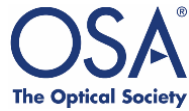
To SPIE, we would like to record our appreciation for their advice and technical skills in the editing and production of the Proceedings of OFS23.

Whatever your reasons for joining OFS-23, we are delighted to welcome you to the city of Santander and to wish you an enjoyable and successful Conference.

José Miguel López-Higuera
Julian Jones
Manuel López-Amo
José Luis Santos

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NanoPhotonics: pushing sensing to its limits in size and speed

Prof. Dr. Niek van Hulst

*ICFO – the Institute of Photonic Sciences and
ICREA – Institució Catalana de Recerca i Estudis Avançats,
Spain*



Abstract:

Optical fibres are historically at the base of near-field optics for nanoscale sensing and microscopy, opening routes to the detection of single molecules, quantum dots, protein complexes, etc. Fibres with conventional sub-wavelength aperture however are inefficient; while fixtures with plasmonic nano-antenna probes are highly superior for light control on the nanoscale. In this presentation I will focus on optical control, both in space and time, by resonant nanoantennas and phase shaped fs pulses.

For spatial control, we manipulate single photon emitters close to optical antennas (monopole dipole, multipole and multi element) to explore nanoscale field concentration, directionality, spectral resonances and sensing applications. Exploiting resonant antenna designs the emission can be enhanced up to 1000 times and steered into narrow forward angular cones.

For temporal control, we exploit phase shaped fs pulses to drive resonant antennas and single quantum systems to dynamically control both their fs response and nanoscale fields. Both amplitude and optical phase of antennas is directly captured. Interestingly when applied to single-molecules and even molecular antenna complexes a superior degree of coherent control beyond the ensemble is realized..

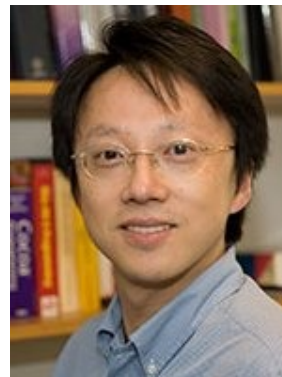
In conclusion, with this presentation I hope to provide insight on the advances and potential of modern photonics at the cross-roads between nm and fs scales.

This work is supported by ERC-Advanced Grant 247330 on NanoAntennas, MICIINN Consolider CSD2007-046, Fundació CELLEX Barcelona and LASERLAB-EUROPE.

Novel light-based technologies for biomedical applications

Prof. Dr. Seok-Hyun Yun

Harvard Medical School-Wellman Center for Photomedicine
Harvard-MIT Health Sciences and Technology, United States



Abstract:

Upon absorption of a photon, molecules can be excited or altered, triggering various photochemical events useful for sensing and therapy. The light-induced processes are thermodynamically robust because of high activation energy, and are energy-efficient because downstream biochemical events may amplify their biological effects. Numerous techniques based on photochemical processes have been developed, such as photodynamic therapy and optogenetics. Despite the great promise of the light-based techniques in medicine, a major common challenge has been the difficulty of delivering light deep into the tissue. Owing to intrinsic absorption and scattering, the penetration depth of light is no more than several mm's in tissue. To date, the clinical use of optical techniques has been limited to superficial layers, such as the skin and retina, or the epithelial surfaces of organs that are accessible by catheters or endoscopes. In this talk, I will present some of the novel, nonconventional, intriguing approaches that have a potential to solve the problem of light delivery, using the concepts originally developed in optical fiber sensor community and employing polymers and cells as biocompatible photonic materials.

Quantum technologies for sensing, metrology and imaging

Prof. Dr. Jonathan P. Dowling

Theoretical Physics, Hearne Institute for Theoretical Physics
Louisiana State University, United States



Abstract:

Over the past 20 years bright sources of entangled photons have led to a renaissance in quantum optical interferometry. These photon sources have been used to test the foundations of quantum mechanics and implement some of the spooky ideas associated with quantum entanglement such as quantum teleportation, quantum cryptography, quantum lithography, quantum computing logic gates, and sub-shot-noise optical interferometers. I will discuss some of these advances and the unification of optical quantum imaging, metrology, and sensing via the common language of quantum optical information processing. In particular I will discuss ways to exploit quantum optical entanglement to beat the Rayleigh diffraction limit in imaging systems such as in microscopes, LIDAR, and optical lithography. I will also discuss how this entanglement can be used to beat the shot noise limit, for example in fiber optical gyroscopes, as well as to the sensing of biological or chemical targets.

INVITED PAPER ABSTRACTS

Given that the following papers were not available at the time of publication, their three associated abstracts have been included.

Three decades of optical fiber sensors commercialization: dawn, present and future

Alexis Mendez, MCH Engineering LLC (United States)

Over the past three decades, fiber optic sensors (FOS) have made a complete transition from basic lab prototypes to successful commercial products. A broad variety of commercial sensors and instruments are nowadays readily available, which enjoy increased acceptance and widespread use in different fields and industries. FOS solutions are commonly used in real-life applications ranging from structural sensing and health monitoring of materials and structures; to downhole pressure and temperature sensors for oil and gas reservoir monitoring; to high voltage and high current sensing systems for the power industry; to biomedical patient devices—among others. The commercialization road has been slow-moving and rocky at times, but always progressive and dotted with multiple successful companies and products.

This talk will provide a historical overview of FOS technology evolution and its associated commercialization efforts over the past 30 years. A historical summary will be made of the early FOS players and products, key present success stories and milestones, and envisioned future prospects. The main goal is to contrast the historical past trajectory against the maturity of its present market and future commercial outlook.

Nanoscale sensing using optical fibres: new photonic architectures and surface functionality enabling novel sensors

Tanya Monro, The Univ. of Adelaide (Australia)

Optical glasses and fibres can be imbued with the properties of nanomaterials, and fibres can be structured with features spanning from 0.02–20 microns. Adding in surface chemistries that offer molecular recognition, one can create sensors to detect specific small molecules or proteins. Emerging sensing architectures will be presented including dip sensors that operate on volumes comparable to a single cell, the detection of single nanocrystals from a distance and fibre-tip sensors.

Direct laser writing in fiber: cladding photonics, optofluidic sensing, and smart catheters

Peter Hermann, Univ. of Toronto (Canada)

The manipulation of femtosecond laser light inside transparent media can be directed on varying interaction pathways to open new directions for creating dense memory storage, three-dimensional (3D) optical circuits, 3D microfluidic networks and high-speed scribing tracks. The presentation follows these fundamental interactions towards controlling glass processes in optical fibers that enable highly functional and compact devices to form with the benefits of seamless integration with single mode optical fibers. 3D optical circuits are formed within the fiber cladding that couple efficiently with the fiber core waveguide while chemical etching of laser-generated nanogratings is further applied to open microfluidic channels and optical resonator components for building into 3D opto-fluidic microsystems. Such all-fiber microsystems offer reduced fabrication and packaging costs for enabling more compact and integrated approaches in telecommunication, fiber laser, sensing, lab-in-fiber, smart medical catheter and biomedical probing device.

