



POF 2019 Program

The 28th International Conference on Plastic Optical Fibers
November 20th—22nd, 2019

10:00 Opening remarks

Plenary session Presider: Y. Koike

10:10 **Silica or Polymer : Which is the better?** (Plenary)
D. N. Payne/ Optoelectronics Research Centre, University of Southampton, UK

10:45 **5G Data Center for DX in CASE+AI Era** (Plenary)
H. Fujiwara/ Chairman and President, CEO, Broad Band Tower, Inc., Japan

11:20 **Fiber Presider : Y. Koike**
GI-POF in Active Optical Cables (Invited)
W. R. White/ Chromis Fiberoptics, Inc., USA

Lunch Time

13:10 **Sensor Presider : K. Krebber**
Copper Oxide Functionalized POF as a H₂S Sensor (Invited)
M. M. Werneck (1, 2), M. M. Keley (1), C. C. Carvalho (1), F. S. Dutra (3), R. C. S. Allil (1)
1: Photonics and Instrumentation Laboratory, Electric Engineering Program, COPPE/ Federal University of Rio de Janeiro, Brazil
2: Nanotechnology Engineering Program, COPPE/ Federal University of Rio de Janeiro, Brazil
3: Petrobras S.A., Brazil

13:30 **A New Method for Measuring the Refractive Index Profile on POFs with a Confocal Raman Microscope** (Invited)
J. Zubia (1), M. Azkune (3), A. Ortega-Gomez (1), I. Ayesta (2), E. Arrospide (2), G. Durana (1), I. Bikandi (1)
1: Department of Communications Engineering, University of the Basque Country (UPV/EHU), Spain
2: Department of Applied Mathematics (UPV/EHU), Spain
3: Department of Electronics Technology (UPV/EHU), Spain

Coffee Break & Exhibition

15:00 **Special Session KPRI International Symposium “Towards 8K, 5G Era”**
Opening Remarks

Tojiro Aoyama, Vice President, Keio University

Complimentary Address

Hiroki Matsuo, Director General for Science, Technology Agency and Innovation Cabinet Office

Special Lectures

Global Data Linkage and Sharing for Medicine

Makoto Suematsu/ President, Japan Agency for Medical Research and Development (AMED), Japan

How will “5G and Beyond” Technology Transform the World?

Motoyuki Ii/ Senior Executive Vice President, Nippon Telegraph & Telephone Corporation (NTT), Japan

NHK’s New 4K8K Satellite Broadcasting Initiatives and Future Prospects

Keiji Kodama/ Director, Engineering Administration Department, Japan Broadcasting Corporation (NHK), Japan

KPRI’s Vision (Nitto • Keio University Optical Cable Joint Research Center)

GI POF towards 8K, 5G era

Toshiyuki Umehara/ Representative Director, Senior Executive Vice President, and CTO, Nitto Denko Corporation, Japan
Yasuhiro Koike/ Director and Professor, Keio Photonics Research Institute, Japan

Guest Speech

David N. Payne/ Director/Professor of Optoelectronics Research Centre, The University of Southampton, UK

Closing Remarks

Eiji Okada/ Dean of the Faculty of Science and Technology, Keio University, Japan

18:00 **Reception**

9:00 Fiber Presider: W. White**Perfluorinated GI Plastic Optical Fiber for High Speed Data Communications (Invited)**

H. Hirase/ Functional Material Application Group, Business Planning Dev., AGC Inc., Japan

9:20 Coating of Thin Polymer Optical Fibers Utilizing the Dip-Coating Process

D. Schrein, L. Overmeyer/ Institute of Transport and Automation Technology, Leibniz Universität Hannover, Germany

9:35 Instability of Natural Convection in an Annular Cavity (Invited)

S. Sondur, A. Mescher/ Department of Mechanical Engineering, University of Washington, USA

Coffee Break**10:15 Sensor Presider: M. Werneck****POF Sensors for Scaling Detection in Membrane Modules for Water Purification (Invited)**

R. Engelbrecht (1), A. Bachmann (1), D. Ilioaie (1), O. Ziemann (1), S. Hager (2), K. Glas (2), M. Meinardus (3), M. Albert (3), W. Heintl (4)

1: Polymer Optical Fiber Application Center (POF-AC), Technische Hochschule Nürnberg Georg Simon Ohm, Germany

2: Chair of Food Chemistry and Molecular Sensory Science, Water Systems Technology, Technische Universität München, Germany

3: Grünbeck Wasseraufbereitung GmbH, Germany

4: Ingenieurbüro Heintl GmbH, Germany

10:35 Distributed Humidity Sensing in PMMA Polymer Optical Fibers (Invited)

S. Liehr, M. Breithaupt, K. Krebber/ BAM Federal Institute for Materials Research and Testing, Germany

10:55 Distributed BOFDA Measurement on an 86 m Long Perfluorinated Polymer Optical Fiber

A. Wosniok, A. Schreier, K. Krebber/ BAM Federal Institute for Materials Research and Testing, Germany

11:10 Characterization of POF for Distributed Strain Sensing with OTDR and Machine Learning

S. A. Dengler (1), M. Lechner (2), M. Luber (1), J. Fischer (1), O. Ziemann (1), F. Gallwitz (2), H. Hangen (3), R. Engelbrecht (1)

1: Polymer Optical Fiber Application Center (POF-AC), Technische Hochschule Nürnberg Georg Simon Ohm, Germany

2: Department of Computer Science, Technische Hochschule Nürnberg Georg Simon Ohm, Germany

3: HUESKER Synthetic GmbH, Germany

11:25 Datacom Presider: Y. Tsukamoto**High-Speed Visible-Light Optical Links Over Standard Plastic Optical Fibre (Invited)**

N. Bamiedakis, X. Dong, R. V. Pentty, I. H. White/ Electrical Engineering Division, Engineering Department, University of Cambridge, UK

11:45 FPGA and APD Based Optical Time Domain Reflectometry in Sensor Applications

J. Vinogradov (1), P. Heindl (1), S. A. Dengler (1), O. Ziemann (1), M. Luber (1), H. Hangen (2), R. Engelbrecht (1)

1: Polymer Optical Fiber Application Center (POF-AC), Technische Hochschule Nürnberg Georg Simon Ohm, Germany

2: HUESKER Synthetic GmbH, Germany

Lunch Time**13:30 Datacom Presider: M. Kagami****Free-Space Optical Communication System for Rail-Guided Vehicles****Using Light-Diffusing Fiber and Fluorophore-Doped Fiber (Invited)**

S. Haruyama (1), M. Ishibashi (2), H. Takizuka (1)

1: Graduate School of System Design and Management, Keio University, Japan

2: Research and Development Headquarters, Murata Machinery, Ltd., Japan

13:50 Low-Noise Graded-Index Plastic Optical Fiber for Next-Generation Home Network (Invited)

A. Inoue, Y. Koike/ Graduate School of Science and Technology, Keio Photonics Research Institute (KPRI), Keio University, Japan

14:10 Low-Distortion Radio Over Fiber Link Based on Graded-Index Plastic Optical Fiber

K. Muramoto (1), A. Inoue (1,2), Y. Koike (1,2)

1: Graduate School of Science and Technology, Keio University, Japan

2: Keio Photonics Research Institute (KPRI), Keio University, Japan

- 14:25 A Probable Game-Changer in the Way of In-Hospital Medical Practice:
A Prospective Combination of an 8K Ultra-High Definition Image and a 5G
with Graded-Index Plastic Optical Fiber Network (Invited)**
T. Chiba (1), Y. Koike (2)
1: Department of medical development and services of ultra-high-definition (UHD) endoscopy, Juntendo University, Japan
2: Faculty of Science and Technology, Keio University, Japan

Coffee Break

15:00 Poster Session

- 9:00 Datacom Presider: Y. Tsukamoto**
**28 GHz Band 5th Generation Mobile Radio Signal Transmission
Employing Graded-Index Plastic Optical Fibers (Invited)**
T. Aiba (1), H. Yasuda (1), S. Tanaka (1), T. Suzuki (1), A. Kanno (2), N. Yamamoto (2), T. Kawanishi (2,3), T. Wakabayashi (1)
1: YAZAKI CORPORATION, Japan
2: National Institute of Information and Communications Technology, Japan
3: Faculty of Science and Engineering, Waseda University, Japan

- 9:20 Investigation of Power Over Fiber Impact on Gigabit Data Transmission in SI-POF**
F. M. A. Al-Zubaidi (1), D. S. Montero (1), A. López (2), J. Zubia (3), C. Vázquez (1)
1: Dpto. Tecnología Electrónica, Universidad Carlos III de Madrid, Spain
2: Aragón Institute of Engineering Research (i3A), Universidad de Zaragoza, Spain
3: Communication Engineering Dpt., ETSI/ Basque Country University, Spain

- 9:35 Recent Progress of Optical Interconnect Technology
Using Short-Wavelength Sensitive Photocurable Resin (Invited)**
O. Sugihara and H. Terasawa/ Graduate School of Engineering, Utsunomiya University, Japan

Coffee Break

- 10:15 Fiber Presider: J. Zubia**
Preparation of Polymer Optical Fiber and Water Purification
G. Takahashi (1), H. Nagakawa (1), T. Sato (1), T. Ochiai (2,3), R. Furukawa (4), M. Nagata (1)
1: Department of Industrial Chemistry, Graduate School of Engineering, Tokyo University of Science, Japan
2: Materials Analysis Group, Kawasaki Technical Support Department, Local Independent Administrative Agency, Kanagawa Institute of Industrial Science and Technology (KISTEC), Japan
3: Photocatalysis International Research Center, Tokyo University of Science, Japan
4: Center for Frontier Science and Engineering, The University of Electro Communications, Japan

- 10:30 Doped Polymer Optical Fiber for On Site Visualization**
R. Furukawa, S. Kamimura/ Graduate School of Informatics and Engineering, The University of Electro-Communications, Japan

- 10:45 Highly Efficient Rhodamine B Doped Polymer Fiber Lasers**
S. Unland (1), S. Spelthann (1,2), J. Thiem (1,2), F. Jakobs (3), J. Kielhorn (3), P. Y. Ang (3), H.-H. Johannes (3,4,5), D. Kracht (1,5), J. Neumann (1,5), A. Ruehl (1,2,4), W. Kowalsky (3,4,5), D. Ristau (1,2,4,5)
1: Laser Zentrum Hannover e.V., Germany
2: Leibniz University Hannover, Institute of Quantum Optics, Germany
3: TU Braunschweig, Institut für Hochfrequenztechnik, Germany
4: Academic Alliance Braunschweig – Hannover QUANOMET, Germany
5: Cluster of Excellence PhoenixD, Hannover, Germany

11:00 Lumogen Dye-Doped Polymer Optical Fibers

P. Y. Ang (1), J. Kielhorn (1), F. Jakobs (1), R. Caspary (1,2), W. Kolwalsy (1,2), H.-H. Johannes (1,2)
 1: Institut fuer Hochfrequenztechnik, TU Braunschweig, Germany
 2: Cluster of Excellence PhoenixD Hannover, Germany

11:15 New Organic Dyes Integrated into Polymer Optical Fibers

J. Kielhorn (1,2), P. Y. Ang (1,2), F. Jakobs (1,2), W. Kowalsky (1,2,3), H.-H. Johannes (1,2,3)
 1: Technische Universität Braunschweig, Institut für Hochfrequenztechnik, Germany
 2: LAPOF project, funded by the European Regional Development Fund
 3: Cluster of Excellence PhoenixD Hannover, Germany

11:30 Sensor Presider: R. Nogueira**Simple Heart Rate Monitoring Using Speckle in POF**

Á. Robledo (1), I. Sánchez (1), J. D. López Cardona (1), M. A. Losada (2), J. Zubia (3), C. Vázquez (1)
 1: Electronics Technology Dpt., Universidad Carlos III Madrid, Spain
 2: Aragón Institute of Engineering Research (i3A), Universidad de Zaragoza, Spain
 3: Communication Engineering Dpt., ETSI/ Basque Country University, Spain

11:45 Optical Sensors for Beer Fermentation on Brewing Process

A. S. Arcas (1,4), A. Dante (2), C. C. Carvalho (2), A. M. S. Werneck (3), R. C. B. Allil (2), M. Werneck (1,2)
 1: Federal University of Rio de Janeiro, Nanotechnology Program/ COPPE, Brazil
 2: Federal University of Rio de Janeiro, Electrical Engineering Program/ COPPE, Brazil
 3: INFNET Institute, Computer Engineering, Brazil

Lunch Time**13:30 Sensor Presider: R. Engelbrecht****Sensor Presider: R. Engelbrecht****Liquid Quality Assessment with Optical Fibre Sensors (Invited)**

R. N. Nogueira (1,2), L. B. Bilro (1,2), F. Sequeira (1), R. Oliveira (1), D. Duarte (1)
 1: Instituto de Telecomunicações, Portugal
 2: Watgrid SA, Portugal

13:50 Advances in Sensing Based on Gratings in CYTOP Fibre (Invited)

K. Kalli/ Photonics & Optical Sensors Research Laboratory, Cyprus University of Technology, Cyprus

14:10 Structural Health Estimation of Concrete Specimens**Using Embedded Perfluorinated FBG Sensors**

A. Theodosiou (1,2), P. Savva (3), M. F. Petrou (3), A. Pospori (2), K. Kalli (2)
 1: Lumoscribe LTD, Cyprus
 2: Photonics & Optical Sensors Research Laboratory, Cyprus University of Technology, Cyprus
 3: Department of Civil and Environmental Engineering, University of Cyprus, Cyprus

14:25 Gamma and Electron Radiation of Plane by Plane Written CYTOP Fibre Bragg Gratings

A. Theodosiou (1,2), A. Stancalie (3), A. Ioannou (1), D. Negut (4), D. Ighigeanu(3), D. Sporea (3), K. Kalli (1)
 1: Photonics & Optical Sensors Research Laboratory, Cyprus University of Technology, Cyprus
 2: Lumoscribe LTD, Cyprus
 3: National Institute for Laser, Plasma and Radiation Physics, Romania
 4: “Horia Hulubei”, National Institute of Physics and Nuclear Engineering, Romania

14:40 Fiber Presider: A. Mescher**Direct Extrusion of Hollow-Core Microstructured Polymer Optical Fiber from 3D Printer**

W. Talataisong (1), T. Rutirawut (1), R. Ismaeel (1,2), M. Beresna (1), G. Brambilla (1)
 1: Optoelectronics Research Centre, University of Southampton, UK
 2: National Oceanography Centre, UK

14:55 Liquid-Core Microstructured Polymer Optical Fibers for Glucose Detection

M. Azkune (1,2), E. Arrospide (3), I. Bikandi (2), G. Aldabaldetrekue (2), C. Vázquez (4), J. Zubia (2)

1: Department of Electronics Technology, Faculty of Engineering (UPV/EHU), Spain

2: Department of Communications Engineering, Faculty of Engineering (UPV/EHU), Spain

3: Department of Applied Mathematics, Faculty of Engineering (UPV/EHU), Spain

4: Electronics Technology Department, Universidad Carlos III de Madrid, Spain

Coffee Break**15:25 Application President: H. Hirase****SI-POF Technology in Automotive Applications (Invited)**

Y. Tsukamoto/ Specialty Resins and Plastics Department, Mitsubishi Chemical Corporation, Japan

15:45 POF Home Network - Solutions, Opportunities & Perspectives (Invited)

J. F. Faller, DI. A. Maier/ Homefibre Digital Network gmbh, Austria

16:05 POF Applications in Robotics

D. Weng, M. Wang, J. Smith/ ChampMinds Optronics Technology Co., Ltd, China

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- P-01 Innovation Management in Laser Research
- Research Project Combines Technological Development with Economic Benefits**
T. Frenzel, L.-D. Fischer/ Ostfalia University of Applied Sciences, Faculty of Mechanical Engineering – Institute of Production Technology, Germany
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- P-02 Intermodal Interference in Millimeter-Long POFs for Temperature Sensing**
S. Hagiwara, N. Matsutani, K. Noda, H. Lee, Y. Mizuno, K. Nakamura/ Institute of Innovative Research, Tokyo Institute of Technology, Japan
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- P-03 Three-Fold Enhanced Temperature Sensitivity of FBG Inscribed in Twisted POF**
T. Ma (1), R. Ishikawa (1), H. Lee (1), A. Theodosiou (2), K. Kalli (2), Y. Mizuno (1), K. Nakamura (1)
1: Institute of Innovative Research, Tokyo Institute of Technology, Japan
2: Photonics and Optical Sensing Research Laboratory, Cyprus University of Technology, Cyprus
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- P-04 Flexible Ring Laser for Creating Fiber-Coupled Resonator**
M. Saito, A. Kubota, R. Yagi/ Department of Electronics and Informatics, Ryukoku University, Japan
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- P-05 Fabrication of Sensors with Humidity Swelling Polymer
for Plastic Optical Fibers by Electro spray Deposition**
R. Ikki, Y. Suzuki, M. Morisawa/ Graduate Faculty of Interdisciplinary Research, University of Yamanashi, Japan
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- P-06 Sensitivity Improvement of Plastic Optical Fiber Alkane Sensor Using Narrow
and Concave Construction**
D. Ushida, Y. Suzuki, M. Morisawa/ Graduate Faculty of Interdisciplinary Research, University of Yamanashi, Japan
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- P-07 Influence of the Injection Point on the Output Power Distribution of Large-Core POFs**
A. López (1), M. A. Losada (1), J. Mateo (1), J. Learte (1), J. Zubia (2), C. Vázquez (3)
1: Aragón Institute of Engineering Research (i3A), Universidad de Zaragoza, Spain
2: Departamento de Ingeniería de Comunicaciones, ETSI/ Universidad del País Vasco (EHU), Spain
3: Departamento de Tecnología Electrónica, Universidad Carlos III de Madrid, Spain
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- P-08 Comparative of Different Core Diameters of POF
in a POF-Based Specklegram Sensor for Breath and Heart Rate Monitoring**
L. Reyes-González (1), F. Anabitarte-García (1), L. Rodríguez-Cobo (2), M. Lomer (1,2,3), J. M. López-Higuera (1,2,3)
1: Photonics Engineering Group, University of Cantabria Spain
2: CIBER-BBN, Instituto de Salud Carlos III, Spain
3: Instituto de Investigación Sanitaria Valdecilla (IDIVAL), Spain
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- P-09 Data Transmission Performance of LED Operating as Optical Receiver
in POF Sensor Network**
R. Kruglov (1), J. Vinogradov (1), O. Ziemann (1), P. Urbanek (2), M. Singh (1)
1: POF-AC, Technische Hochschule Nürnberg Georg Simon Ohm, Germany
2: Laboratory for embedded systems, Technische Hochschule Nürnberg Georg Simon Ohm, Germany
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- P-10 Measurement of Spontaneous Brillouin Scattering in GI-POF
with High Signal-to-Noise Ratio at Low Pump Power**
R. Kruglov, R. Engelbrecht/ POF-AC, Technische Hochschule Nürnberg Georg Simon Ohm, Germany
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- P-11 Contrast Analysis of Speckle Patterns in POF**
M. Lomer (1,2,3), L. Rodríguez-Cobo (1,2), J. M. Lopez-Higuera (1,2,3)
1: Photonics Engineering Group, University of Cantabria, Spain
2: CIBER – BBN, Instituto de Salud Carlos III, Spain
3: Instituto de Investigación Sanitaria Valdecilla (IDIVAL), Spain
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- P-12 POF-Based Spatially Resolved Temperature Sensing with Enhanced Signal-to-Noise Ratio**
H. Lee, N. Hayashi, Y. Mizuno, K. Nakamura/ Institute of Innovative Research, Tokyo Institute of Technology, Japan
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- P-13 Study of the Functionalization of Gold Nanoparticles for POF Biosensor Applications**
A. R. B. Andrade (1), M. M. Werneck (1,2), R. C. S. B. Allil (2)
1: Universidade Federal do Rio de Janeiro, Nanotechnology Program/COPPE, Brazil
2: Universidade Federal do Rio de Janeiro, Electrical Engineering Program/COPPE, Brazil
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- P-14 Low-Noise Plastic Optical Fiber Material for Consumer Optical Communication System**
T. Akashi (1), A. Inoue (1,2), Y. Koike (1,2)
1: Graduate School of Science and Technology, Keio University, Japan
2: Keio Photonics Research Institute (KPRI), Keio University, Japan
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- P-15 Modulation Condition Dependence of Transmission Quality in Low-Noise Graded-Index Plastic Optical Fiber Link**
F. Kobayashi (1), A. Inoue (1,2), Y. Koike (1,2)
1: Graduate School of Science and Technology, Keio University, Japan
2: Keio Photonics Research Institute (KPRI), Keio University, Japan
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- P-16 Low-Noise Plastic Optical Fiber for Do-It-Yourself Optical Connection in Radio Over Fiber**
K. Nishiyama (1), A. Inoue (1,2), Y. Koike (1,2)
1: Graduate School of Science and Technology, Keio University, Japan
2: Keio Photonics Research Institute (KPRI), Keio University, Japan
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- P-17 Polarization-Dependent Absorption of a Stressed Birefringence-Reduced Polymer Optical Fiber Doped with Dichroic Dye**
K. Uzawa (1), R. Furukawa (1), K. Yano (2)
1: Graduate School of Informatics and Engineering, The University of Electro-Communications, Japan
2: HAYASHIBARA CO., LTD., Japan
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- P-18 Experimental Modal Analysis Using a POF Bundle-Based Optical Sensor**
G. Durana (1), A. Alonso (1), J. Albizuri (2), E. Arrospide (3), J. Zubia (1), M. A. Losada (4)
1: Communications Engineering Department, University of the Basque Country UPV/EHU, Spain
2: Mechanical Engineering Department, University of the Basque Country UPV/EHU, Spain
3: Applied Mathematics Department, University of the Basque Country UPV/EHU, Spain
4: Electronics and Communications Engineering, Universidad Zaragoza, Spain
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- P-19 Standardization Trends for Automotive Ethernet**
M. Kagami / Automotive Network Institute of the Next Generation, Nagoya Institute of Technology, Japan
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- P-20 Free-Space Optical Communication System for Industrial Vehicles Using Fluorophore-Doped Plastic Optical Fiber**
M. Ishibashi (1), H. Takizuka (2), S. Haruyama (2)
1: Research and Development Headquarters, Murata Machinery, Ltd., Japan
2: Graduate School of System Design and Management, Keio University, Japan
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- P-21 Model Estimation of Free Surface Location in Polymer Fiber Drawing**
M. Doddasomayajula, A. Mescher/ Department of Mechanical Engineering, University of Washington, USA
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- P-22 Advanced Manufacturing of Polymer Preforms for Nano-Crystal Alignment**
L. Tauzer, X. Xia, P. Pauzauskie, A. Mescher/ Department of Mechanical Engineering, University of Washington, USA