I3S 2019

7th International Symposium on Sensor Science

09 – 11 May 2019, Napoli, Italy

Program and Abstract Book

7th International Symposium on Sensor Science

7th International Symposium on Sensor Science

MDPI • Basel • Beijing • Wuhan • Barcelona • Belgrade

Centro Congressi Federico II
Napoli, Italy
9–11 May 2019

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Luigi Zeni Nunzio Cennamo Aldo Minardo

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Letizia De Maria, Italy
Antonio Varriale, Italy
Bruno Andò, Italy
Leszek R. Jaroszewicz, Poland
Fabrizio Di Pasquale, Italy
Maria Pesavento, Italy
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Alessandra Bossi, Italy
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Organised by

Università degli Studi della Campania *Luigi Vanvitelli*

Conference Secretariat

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Suzie Li Lucia Russo

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7th International Symposium on Sensor Science 9–11 May 2019, Napoli			
	Thursday 9 May 2019	**Friday 10 May 2019**	**Saturday 11 May 2019**
Morning	Check-in Opening Ceremony **Chairs: Luigi Zeni, Nunzio Cennamo & Aldo Minardo** *S1. Chemical Sensors*	*S3. Biosensors*	*S6. SPECIAL SESSION. Specialty Optical Fibers for Sensing* *S7. SPECIAL SESSION. Materials, Microfluidics, Configurations and Strategies for Sensing*
	Coffee Break	**Coffee Break**	**Coffee Break**
	S1. Chemical Sensors	*S3. Biosensors*	*S8. SPECIAL SESSION. Distributed Sensing in Optical Fibers*
	Lunch	**Lunch**	**Closing Remarks**
Afternoon	*S2. Sensor Applications*	*S4. Physical Sensors*	
	Coffee Break	**Coffee Break**	
	S2. Sensor Applications	*S5. Optical Sensors*	
	Poster Session 1	**Poster Session 2**	
		Social Events	

Thursday 9 May 2019: 08:00–13:00/14:15–19:45
Friday 10 May 2019: 09:00–12:45/14:15–19:00/**Conference Dinner: 20:00**
Saturday 11 May 2019: 09:00–14:30

Symposium Programme

Day 1: Thursday 9 May 2019

08:00–08:30	Check-in
08:30–09:00	Opening Ceremony

Session 1—Chemical Sensors (*Part 1*)
Chair: **Manel Del Valle**

09:00–09:30	**Sergey Piletsky—Invited Lecture** Novel Assay and Sensor Platforms Based on MIP Nanoparticles
09:30–09:45	**Hugues Brisset** Advanced Electrochemical Molecularly Imprinted Polymer as Sensor Interfaces
09:45–10:00	**Anja Drame** Nanostructured Molecularly Imprinted Polyaniline for Acrylamide Sensing
10:00–10:15	**Michael Tiemann** Highly Selective Sensing of H_2S Gas by a CuO/SiO_2 Nanocomposite
10:15–10:30	**Špela Trafela** Modified Nickel Nanowires for Electro-Catalytic Oxidation of Formaldehyde in Alkaline Solutions
10:30–10:45	**Sukon Phanichphant** WO_3 Loaded with Carbon-Based Materials as Nanocomposite NO_2 Gas Sensing
10:45–11:15	Coffee Break

Session 1—Chemical Sensors (*Part 2*)
Chair: **Maria Pesavento**

11:15–11:45	**Daniel Mandler—Invited Lecture** Nanoparticles Imprinted Matrices: A Method for Speciation of Nanoparticles
11:45–12:00	**Piotr Wiench** Electrochemical Performance of Dopamine Sensors Based on N-Doped Reduced Graphene Oxides with Different Type of Nitrogen Functional Groups as Electrode Materials
12:00–12:15	**Antonino Scandurra** Graphene Paper-Gold Nanostructured Electrodes Obtained by Laser Dewetting for High Sensitive Non-Enzymatic Glucose Sensing
12:15–12:30	**Manel del Valle** Comparison of Performance of Electronic Tongue Systems for Volatile Phenol Detection in Wine: Use of Modified Sensors, Molecularly-Imprinted Sensors and Enzyme-Based Biosensors
12:30–12:45	**Luis Coelho** Colorimetric Fiber Optic Based Probe for Real-Time Monitoring of Dissolved CO_2 in Aquaculture Systems
12:45–13:00	**Kristina Zagar Soderznik** $BaTiO_3$ Based Nanostructures for Humidity Sensing Applications
13:00–14:15	Lunch

Session 2—Sensor Applications (*Part 1*)
Chair: **Letizia De Maria**

14:15–14:45	**Corrado Di Natale—Invited Lecture** Combinatorial Selectivity of Porphyrins Based Gas Sensors
14:45–15:00	**Justyna Szerement**

	Seven-Rod Dielectric Sensor for Determination of Soil Moisture in Small Volumes
	David Valentin
15:00–15:15	Experimental-Numerical Design of a Bioreactor Prototype for Cell Vibration Experiments
15:15–15:30	**De Vito Saverio** Urban Participative Air Quality Sensor Network for Street Scale Assessments
	Cátia Magro
15:30–15:45	Triclosan Detection in Aqueous Environmental Matrices by Thin-Films Sensors: Impedantiometric Electronic Tongue
	Carosena Meola
15:45–16:00	The Contribution of Infrared Thermography in the Characterization of Glass/Epoxy Laminates Through Remote Sensing of Thermal-Stress Coupled Effects
16:00–16:30	Coffee Break

Session 2—Sensor Applications (*Part 2*)
Chair: **Pedro Jorge**

16:30–17:00	**Ellen Holthoff—Invited Lecture** Photonic Integrated Circuit Sensor for Human Performance Monitoring
	Paulo Zagalo
17:00–17:15	Detection of Triclosan in Tuned Solutions by pH and Ionic Strength Using PAH/PAZO Thin Films
	Josep Escrig
17:15–17:30	Predicting the Alcohol Content during Fermentation Using Sensor Measurements and Machine Learning
17:30–17:45	**Nicholas Watson** Monitoring the Different Stages of Industrial Cleaning Using Ultrasonic Sensors
	Francesco Fienga
17:45–18:00	Fiber Optic Monitoring System for Beam Induced Heating on High Energy Accelerator's Beam Pipes
	Priya Vizzini
18:00–18:15	Brettanomyces Bruxellensis Detection by Optical and Acoustic Biosensor in Comparison
18:15–18:30	**Alessandra Bonanni** Electroactive Nanocarbon as Novel Label for DNA Analysis
	Andrey Legin
18:30–18:45	Potentiometric Multisensor System for Plutonium Quantification in Spent Nuclear Fuel Reprocessing
18:45–19:45	**Poster Session 1**

Day 2: Friday 10 May 2019

Session 3—Biosensors (*Part 1*)
Chair: **Antonio Varriale**

	Simonetta Grilli—Invited Lecture
09:00–09:30	The Pyro-Electrohydrodynamic Jet Accumulation: A New Tool for High Sensitive Detection of Low Abundant Biomolecules
	Sara Tombelli
09:30–09:45	Intracellular Sensing by Molecular Beacons Coupled to Nanoparticles in Human Cancer Cells

	Gina Greco
09:45–10:00	Development and Characterization of an Ultra High Frequency (UHF) Love-Surface Acoustic Wave (L-SAW) Biosensor
	Riccarda Antiochia
10:00–10:15	Transdermal Microneedle Array-Based Biosensor for Real Time Simultaneous Lactate and Glucose Monitoring
10:15–10:30	**Ilaria Sorrentino** Bio-Functionalization of Graphene with a Laccase Hydrophobin Chimera
10:30–10:45	**Larysa Baraban** Smart Lab-on-a-Chip Nanosensor Platform for Cancer Diagnostics
10:45–11:15	Coffee Break

Session 3—Biosensors (*Part 2*)
Chair: **Alessandra Bossi**

	Monique Lacroix—Invited Lecture
11:15–11:45	Development of Rapid Immunodetection Tests of *Escherichia coli* O157: H7 and *Listeria monocytogenes* on Working Surfaces in Food Industries
11:45–12:00	**Elena Piletska** Identification Of Epitopes And Molecular Markers Using Molecular Imprinting
	Robert Crapnell
12:00–12:15	Smart Thermometers Functionalized with High Affinity Nanoparticles for the Thermal Detection of Cardiac Biomarkers
12:15–12:30	**Filippo Causa** Microgels for High Sensitive, Direct and Multiplexed miRNAs Optical Sensing
	Pallab Kumar Bairagi
12:30–12:45	Cobalt-Dispersed Reduced Graphene Oxide Nanocomposite for the Selective Electrochemical Detection of Methyl Nicotinate
12:45–14:15	Lunch

Session 4—Physical Sensors
Chair: **Bruno Andò**

14:15–14:45	**Massimo De Vittorio—Invited Lecture** Wearable Piezoelectric Sensor Technologies for Health Monitoring
	Arcady Zhukov
14:45–15:00	Novel Sensing Technique for Non-Destructive and Non-Contact Monitoring of the Composites
	Andrei Turutin
15:00–15:15	Pushing of Acoustic and Thermal Noises in Magnetoelectric Sensors Based on Bidomain Lithium Niobate
	Giuseppe Ruzza
15:15–15:30	Low-Cost MEMS Accelerometers for Tilt Measurement: Thermal Analysis, Compensation and Application
	Nicolas Glaser
15:30–15:45	Printed Pressure Sensor for Medical Devices: An Example for Tracheal Intubation Monitoring
15:45–16:15	Coffee Break

Session 5—Optical Sensors
Chair: **Lucia Bilro**

16:15–16:45	**José Luís Santos—Invited Lecture** Paths for Optical Sensing
16:45–17:00	**Marco Pisco** Opto-Mechanical Lab-On-Fiber Accelerometers
17:00–17:15	**Heeyoung Lee** Distributed Strain Measurement Using Power-Based Brillouin Sensor with Three Folded Dynamic Range
17:15–17:30	**Luca Palmieri** A Rugged Fiber Optic Pressure Sensor for Underground Water Level Monitoring
17:30–17:45	**Mikel Bravo Acha** Optical Fiber Sensors in Asphalt for Smart Cities Traffic Monitoring
17:45–18:00	**Dragan Indjin** Optical Feedback Interferometry with THz Quantum-Cascade Lasers: Progress in THz Sensing and Imaging
18:00–19:00	**Poster Session 2**
19:15–20:00	**Visiting 'Chiostro di Santa Chiara' and 'Presepe Napoletano di Santa Chiara'**
20:00	**Conference Dinner**

Day 3: Saturday 11 May 2019

Session 6—Specialty Optical Fibers for Sensing
Chair: **Leszek R. Jaroszewicz**

09:00–09:30	**Lucia Bilro—Invited Lecture** POF Sensors and Applications
09:30–09:45	**Demetrio Sartiano** Three Lobes Plastic Optical Fiber Bending and Rotation Sensor
09:45–10:00	**Leonardo Binetti** Measurement of Viscoelasticity of Sodium Alginate by Fibre Bragg Grating
10:00–10:15	**Evert Jonathan van den Ham** Enhanced IR-Based Optical Sensing of Phosphates in Aqueous Environment
10:15–10:30	**Alessandra Maria Bossi** Plasmonic Platform in Plastic Optical Fibers Combined with Molecularly Imprinted Nanogels to Sense Ultralow Protein Concentrations

Session 7—Materials, Microfluidics, Configurations and Strategies for Sensing
Chair: **Pietro Ferraro**

10:30–11:00	**Jaroszewicz R. Leszek—Invited Lecture** Innovative Fiber-Optic Rotational Seismograph
11:00–11:15	**Edmondo Battista** Peptide Assisted Imprinting for Turn-On Fluorescence Detection of Proteins
11:15–11:30	**Hannah Dies** Electrokinetic Assembly of Gold Nanoparticles into Sensitive and Functionalizable Surface-Enhanced Raman Scattering-Based Sensors
11:30–11:45	**Lisa Miccio** In-Flow Label-Free Imaging for Single Cell Analysis

	Matteo Parmeggiani
11:45–12:00	P3HT Processing Study for In-Liquid EGOFET Biosensors: Effects of the Solvent and the Surface
12:00–12:30	Coffee Break

Session 8—Distributed Sensing in Optical Fibers
Chair: **Fabrizio Di Pasquale**

	Yosuke Mizuno—Invited Lecture
12:30–13:00	Brillouin Optical Correlation-Domain Reflectometry: Current Status and Future Perspectives
	Sascha Liehr
13:00–13:15	Wavelength-Scanning Distributed Acoustic Sensing for Structural Monitoring and Seismic Applications
	Enis Cerri
13:15–13:30	High-Spatial Resolution Brillouin Sensing: Evaluation Tests for Temperature Monitoring in Aerospace Scenarios
	Ali Masoudi
13:30–13:45	60km Range Single-Ended Distributed Optical Fibre Vibration Sensor with In-Line Raman Amplification
	Yonas Muanenda
13:45–14:00	Dynamic Phase Retrieval in a High-SNR DAS Based on UWFBGs without Phase Unwrapping Using a Scalable Homodyne Demodulation and Direct Detection
14:00–14:30	**Closing Remarks & Awards Ceremony**

Poster Session 1 （Day 1: Thursday 9 May 2019）

65	Ki-Il Kim	Object Tracking Based on (m,k)-firm Model in Multimedia Wireless Sensor Networks
66	Arcady Zhukov	Magnetic Properties and Applications of Glass-Coated Ferromagnetic Microwires
67	Jaroszewicz R. Leszek	Optical System for Variable Depolarizer Characterization
68	Leonardo Pantoli	A remote WSN for rockfall monitoring in hostileenvironment
69	Vincenzo Romano Marrazzo	Analytical and Numerical Simulations of a Fast Wide-Range AWG-Based Interrogation Technique for FBG Sensor
70	Aristides Docoslis	Assembly of Nanostructures using an AC Electric Field for Detection and Identification of Analytes using Surface-Enhanced Raman Scattering (SERS)
71	Antoni Grau	Automatic generation of datasets for learning-based UAV pipe detection by computer vision
72	Rongshan Wei	Design of Double Three-Contact Vertical Hall Device Based on Conformal Mapping Technology
73	Ramona Galatus	Evanescent field monitoring for film thickness evaluation in metallic layer surface plasmon resonance biosensor setup
74	Vincenzo Romano Marrazzo	FBG-based monitoring system for smart tires application with wireless instrumentation under real-time rolling condition
75	Yuichiro Sakajiri	Feasibility Study on Fabric-Sheet Unified Sensing Electrode for Non-Contact In-Bed Measurements of ECG, Body Proximity and Respiratory Movement
76	Natiely Hernández Sebastián	Integrated bidirectional inductive-array design for power transfer in implantable BioMEMS
77	Wei Li Ang	Investigating changes to the biosensing mechanism by tuning the concentrations of Graphene Quantum Dots towards the optical detection of Ochratoxin A
78	Luis Coelho	Preliminary study for detection of hydrogen peroxide using a hydroxyethyl cellulose membrane
79	Basem Aljoumani	A comparison of classic and machine-learning approaches to determine soil salinity and soil water content using time domain reflectometry
80	Kiran Van der Laan	A Fluorescent Nanodiamond Biosensor: Towards Free Radical Sensing in Chronologically Ageing Yeast Cells
81	Abdul Ghaffar	A low Cost Wide Range Plane-in-out Displacement Measurement Sensor Based on Twisted Macro-Bend Coupling Method
82	Román Fernández	A PoCT microfluidic device based on monolithic HFF-QCM sensor array.
83	Luis Coelho	A Simple Spectral Interrogation System for Optical Fiber Sensors
84	Alhulw Alshammari	Adaptive and sensitive fibre-optic fluorimetric transducer for air- and water-borne analytes
85	Gina Greco	An ultra-high-frequency surface-acoustic-wave lab-on-chip for the detection of brain-pathology biomarkers
86	Juanjuan Li	Effects of Adhesive Parameters on Dispersion Characteristics of Ultrasonic Guided Waves in Composite Pipes

87	Agostino Iadicicco	Bi-dimensional deflection estimation by embedded fiber Bragg gratings sensors
88	Pablo Fanjul-Bolado	Chimera Protein based Disposable Biosensor for the Electrochemical Monitoring of Polyphenolic Compounds
89	Kun Li	Chinese Traditional Musical Instrument Evaluation Based on a Smart Microphone Array Sensor
90	Elliot Woolley	Cleaning Assurance for Reusable Plastic Packaging using Ultraviolet Induced Fluorescence
91	Akinori Ueno	Comparison of Underwater ECG Measurement between Voltage-Based and Current-Based Methods Using Hydrophobic Silicone Electrode
92	Huichao Yan	Denoising of MEMS Vector Hydrophone Signal Based on Empirical Model Wavelet Method
93	Vincenzo Marletta	Design and characterization of a pressure sensor based on FBG on steel substrate
94	Salvatore Pirozzi	Design of a Force/Tactile Sensor for Robotic Grippers
95	Laura Fernández Llano	Development of a rapid and simple sensor for determination of catalase activity in real samples
96	Ramona Galatus	Identification of dynamic models for temperature sensors in hyperthermic chemotherapy
97	Yossi Rosenwaks	Sensitive and Selective NH3 Detection under High Humidity using Electrostatically Formed Nanowire (EFN) Transistor
98	Pierre Mullot	ECOCAPTURE: Eye tracking access to apathy in real-space ecological environment. Gaze behavior in frontotemporal dementia
99	Aymen Mousli	ECOCAPTURE: Quantifying apathy in frontotemporal dementia with eye tracking measures performed in real-space ecological environment
100	Eliska Sedlackova	Effect of graphene oxide modification on a DNA biosensor developed for the detection of methylated DNA associated with cancer
101	Benoit Piro	Electrolyte Gated Organic Field Effect Transistors for Chemical Monitoring of Living Cells
102	Giuseppe Quero	Engineered Lab-On-Fiber SERS Optrodes based on Nanosphere Lithography
103	Grażyna Gryglewicz	Enhanced performance of GCE/N-reduced graphene oxide-Au nanocomposite in dopamine sensing
104	Paola Zuppella	Exploiting several buffer layers in SPR D-shaped POF sensors based on gold film for different applications.
105	Marco Consales	Fiber optic sensors integrated in aircraft landing gears for load monitoring

Poster Session 2 （Day 2: Friday 10 May 2019）

106	Rubin Gulaboski	Getting Insight into Enzymes Kinetics and Thermodynamics via Theoretical Models in Protein-film Square-wave Voltammetry
107	Moonsuk Yi	Improved Sensitivity of Urchin-like ZnO Nanostructures with Added Two-Dimensional Electron Gas in MgZnO/ZnO Interfaces.
108	Emilia Damiano	Investigating the progressive failure of unsaturated granular soil through a small-scale physical slope model and a high spatial resolution distributed strain sensor
109	Filipa Sequeira	Low-cost sensing with plastic optical fibers - from turbidity and refractive index to chemical sensing
110	Ilya Kubasov	Low-frequency vibration sensor with a sub-nm sensitivity using a bidomain lithium niobate crystal
111	Riccardo Funari	Monitoring Bacterial Biofilm Formation Using LSPR Sensors for Biofilm Specific Drug Screening
112	Henri Nouws	Nano- and micro material-based electrochemical bioassays for the non-invasive electrochemical detection of HER2-ECD, a breast cancer biomarker
113	Cosimo Trono	Novel fabrication technique of superimposed LPG with different grating pitches for the simultaneous detection of refractive index and temperature
114	Reem Sweid	Modeling Tools for the Optimization of Optical Fiber Tweezers
115	Rodrigo Munguía	Observability Analysis for Parameter Identification of a Quadrotor
116	Nerea De Acha	Optical fiber luminescent aptasensor for the detection of Hg2+ ions in aqueous media
117	Kyoung Won Jang	Optical Filters Embedded Fiber-optic Radiation Sensors for Radiotherapy Dosimetry
118	Letizia De maria	Optical voltage transducer for embedded medium voltage equipment: design and parameters optimization
119	Marcus Wolff	Photoacoustic detection of short-chained hydrocarbon isotopologues
120	Juhani Virtanen	Piezoelectric dual axis cantilever sensor for dynamic low force measurements on an open source based platform
121	Alessandro Chiado'	Plasmonic nanostructures integrated in microfluidic chips for the sensitive SERS detection of miRNAs
122	Maria Pesavento	Plasmonic optical fiber sensors and molecularly imprinted polymers for food safety applications
123	Anna Rita Bizzarri	Portable Immunosensor Based on Extended Gate – Field Effect Transistor for Rapid, Sensitive Detection of Cancer Markers
124	Xianjing Li	Position measurement based on fisheye imaging
125	Zeljka Cvejic	Potential of sumanene modified with boron and nitrogen atoms for adsorption of carbon dioxide: DFT and SAPT study
126	Dermot Diamond	Real-time analysis of electrolytes in sweat through a wearable sensing platform
127	Jun-Xiang Zhang	Robot-Assisted Acupuncture

128	Elena Korotkova	Selection of optimal stabilizers for silver nanoparticles as labels for electrochemical sensors
129	Agostino Iadicicco	Sensing Features of Arc-induced Long Period Gratings
130	Maria Pesavento	Sensing of copper(II) by immobilized ligands: comparison of electrochemical and surface plasmon resonance transduction.
131	Maria Pesavento	Sensing of furfural by molecularly imprinted polymers on Plasmonic and Electrochemical platforms
132	Jaroslava Bezděková	Sensing of nucleic bases based on molecularly imprinted polymers
133	David Valiente	Dynamic catadioptric sensory data fusion for visual localization inmobile robotics
134	Niccolò Paccotti	SERS analysis of bacterial strains: Escherichia coli and Staphylococcus epidermidis
135	Duarte Viveiros	Spectral tuning of Long Period Fiber Gratings fabricated by Femtosecond laser micromachining through thermal annealing
136	Raquel Cervigon Abad	Suitability of general purpose PPG-based wearable devices for HRV analysis
137	Giuseppe Quero	Ultra-high Dose Monitoring with Innovative Lab-on-Fiber Radiation Dosimeter
138	Christophe Delebarre	Wireless air quality sensor systems for pollution mapping.
139	Michele Riccio	Wireless electronic sensing system for real-time monitoring of pneumatic tires
140	Stefano Boscarino	ZnO-MWCNTs hybrid layer for UV light detection
141	Carlo Trigona	A Green slab waveguide for plasmonic sensors based on Bacterial Cellulose
142	Yijie Sun	OFDR Sensing Technology based Distributed Monitoring and Stability Analysis of Geogrid-Reinforced-Slope
143	Vinicius Kartnaller	Development of a Real Time Image Analysis Sensing Methodology for pH Measurement in Pressurized Systems and Application for CO2-H2O Systems

Abstract

106. Getting Insight into Enzymes Kinetics and Thermodynamics via Theoretical Models in Protein-Film Square-Wave Voltammetry

Milkica Janeva, Viktorija Maksimova and Rubin Gulaboski *

University Goce Delcev

* Correspondence: rubin.gulaboski@ugd.edu.mk

We present in this work several relevant theoretical models of Protein-film square-wave voltammetry of uniformly adsorbed molecules of redox enzymes. Theoretical consideration of several one-electron step and two-electron step mechanisms that are coupled to preceding, follow up or regeneration (catalytic) chemical steps under conditions of square-wave voltammetry reveal many new aspects, especially by enzymatic electrode reactions featuring fast electron transfer. We show in this work that the phenomena of "split net-SWV peak" and "quasireversible maximum", which are typical for simple protein-film reactions studied in square-wave voltammetry, are strongly affected by kinetics and thermodynamics of preceding, follow-up, or regenerative chemical steps. While we present plenty of relevant voltammetric situations useful for recognizing all relevant and most common protein-film mechanisms in square-wave voltammetry, we also propose several new approaches to get access to kinetics and thermodynamics of chemical steps in all those mechanisms. Most of the results in this work throw new insight into the features of protein-film systems that are coupled with chemical reactions.