
Curriculum Vitæ of Ivan Elmi

Name	Ivan
Surname	Elmi
Address	Via Picervara, 61 40048 San Benedetto Val di Sambro – Bologna
Phone	339 1615355
E-mail	elmi@bo.imm.cnr.it
Nationality	Italian
Born	21/05/1972, Bologna

STUDIES

Date	21/03/1998
Title	Degree in Physics
Institution	Università degli Studi di Bologna
Title	Characterization of a Benzene sensor based on a SnO ₂ thin film deposited by Pulsed Laser Ablation on a Silicon Micromachined Si ₃ N ₄ membrane substrate

Date	June 1991
Title	Maturità Tecnica Industriale
Institution	ITIS Odone Belluzzi di Bologna
Specialization	Industrial Physics
Punteggio	58/60

LANGUAGE SKILLS

Mother language	Italian
Other languages	English good
	French basic knowledge

WORK EXPERIENCE

Period	since 16/02/2009
Institution	CNR – IMM Bologna
Contract	Researcher
Field of activities	Sensors and Microsystems Responsible for the fabrication lines for gas microsenors and MEMS devices for gas sensing

Period	from 01/01/2005 to 15/02/2009
Institution	CNR – IMM Bologna
Contract	Fixed-term contract
Field of activities	Sensors and Microsystems Responsible for the fabrication lines for gas microsenors and MEMS devices for gas sensing

Period	from 01/03/1999 to 31/04/2004
Institution	CNR – IMM and CNR-LAMEL Bologna
Contracts	Different forms of fixed-term contracts and research grants
Field of activities	Development of MEMS based gas sensors and gas-chromatographic systems

EXPERTISE

Technical expertise

Microelectronic and micromachining technologies:

- Bulk micromachining (wet and dry etching)
- Wafer alignment and wafer bonding
- Thin film depositions
- Electron beam lithography
- Focussed Ion Beam
- Inspection processes

Development of clean-room process flows for MEMS fabrication, including:

- MOX Gas Sensors
- Back Micromachined Hotplates
- Front Micromachined Ultra Low Power Hotplate Arrays
- Back Micromachined Bolometer Array and Front Micromachined Bolometer Array
- Microfluidic Devices (packed channel for separation and concentration chromatographic column)
- Micro injector loop for gas-chromatographic system based on micromachined membrane valve
- Front Micromachined Thermal Conductivity Detector

Use, handling and maintenance of technological equipment including: aligners, wafer bonders, sputtering, profilometers, vacuum systems, dry benches

Gas sensor data acquisition and signal processing

Development of gas sensor operation modes including temperature modulation

Design, prototyping and characterization of gas-chromatographic equipment

End-of-line technologies including: SEM inspection, wafer dicing, wire bonding and packaging

Design and assembly of gas sensor and gas sensing system characterization benches;

Organizational expertise

Cooperation in drafting of national and international research projects including European Framework calls FP6, FP7 and H2020

Participation to EU-funded projects:

- FP5 Clean-Air
- FP6 IP GoodFood (ID 508774)
- FP7 DIRAC (ID 242309):
- H2020 Rocsafe (ID 700264):
- H2020-SMEInst2 picoGC (ID 756439)

Participation to nationally funded projects:

- FIRB RBNE019TMF
- FISIR 16Ott2000

Collaborations with SMEs:

- Pollution spa Budrio (BO)
- Arcotronics, Bologna
- Co.R.Am / Unitech, Ferrara
- AES, Terni
- Aermec SpA, Monza

PUBLICATIONS

Peer reviewed

30 ISI-JCR publications:

- F.S. Romolo, S. Mengali, N. Liberatore, R. Viola, S. Zampolli, **I. Elmi**, R. Chirico,
"On-site GC-QEPAS analysis on the scene of crime: The RISEN project"
 Toxicologie Analytique et Clinique 34 supplement, September (2022), S161
 doi:10.1016/j.toxac.2022.06.275
- A. Rozzi, A. Pedrini, R. Pinalli, E. Cozzani, **I. Elmi**, S. Zampolli and Enrico Dalcanale,
"Cavitand Decorated Silica as a Selective Preconcentrator for BTEX Sensing in Air"
 Nanomaterials 12 (2022), 2204
 doi:10.3390/nano12132204
- E. Dalcanale, A. Rozzi, A. Pedrini, R. Pinalli, C. Massera, **I. Elmi** and S. Zampolli,
"Tuning the conformational flexibility of quinoxaline cavitands for complexation at the gas-solid interface"
 Chemical Communications 58, 7554 (2022)
 doi:10.1039/d2cc02710k
- Zampolli S; **Elmi I**; Cardinali GC; Masini L; Bonafè F; Zardi F
"Compact-GC platform: A flexible system integration strategy for a completely microsystems-based gas-chromatograph"
 Sensors and actuators. B, Chemical, 305 (2020) 127444
 doi: 10.1016/j.snb.2019.127444
- Zampolli S; Mengali S; Liberatore N; **Elmi I**; Masini L; Sanmartin M; Viola R.
"A MEMS-enabled deployable trace chemical sensor based on fast gas-chromatography and quartz enhanced photoacoustic spectroscopy"
 Sensors (2019)
 doi: 10.3390/s20010120
- Liedtke S; Zampolli S; **Elmi I**; Masini L; Barboza T; Dalcanale E; Pinalli R; Pähler M; Drees C; Vautz W
"Hyphenation of a MEMS based pre-concentrator and GC-IMS"
 Talanta 191 (2019) 141–148
 doi: 10.1016/j.talanta.2018.07.057
- Vautz W; Franzke J; Zampolli S; **Elmi I**; Liedtke S
"On the potential of ion mobility spectrometry coupled to GC pre-separation – A tutorial"
 Analytica Chimica Acta 1024 (2018) 52e64
 doi: 10.1016/j.aca.2018.02.052
- Massimo Zambianchi, Annalisa Aluigi, Massimo Luigi Capobianco, Franco Corticelli, **Ivan Elmi**, Stefano Zampolli, Francesco Stante, Letizia Bocchi, Franco Belosi, Maria Luisa Navacchia, Manuela Melucci
"Polysulfone Hollow Porous Granules Prepared from Wastes of Ultrafiltration Membranes as Sustainable Adsorbent for Water and Air Remediation"
 Advanced Sustainable Systems [], Volume: 1 Issue: 7 (2017)
- Jakub W Trzcinski, Roberta Pinalli, Nicolò Riboni, Alessandro Pedrini, Federica Bianchi, Stefano Zampolli, **Ivan Elmi**, Chiara Massera, Franco Ugozzoli, Enrico Dalcanale
"In Search of the Ultimate Benzene Sensor: The EtQxBox Solution."
 ACS sensors [American Chemical Society], Volume: 2 (2017) Issue: 4 Pages: 590-598
 DOI: 10.1021/acssensors.7b00110
- F. Fuschino, R. Campana, C. Labanti, M. Marisaldi, L. Amati, M. Fiorini, M. Uslenghi, G. Baldazzi, Y. Evangelista, **I. Elmi**, M. Feroci, F. Frontera, A. Rachevski, L.P. Rignanese, A. Vacchi, G. Zampa, N. Zampa, I. Rashevskaya, P. Bellutti, C. Piemonte
"The XGS instrument on-board THESEUS"
 Journal of Physics: Conference Series [IOP Publishing], Volume: 763 (2016) Issue: 1 Pages: 012009
 doi:10.1088/1742-6596/763/1/012009
- C. Cagliero, S. Galli, M. Galli, **I. Elmi**, M. Belluce, S. Zampolli, B. Sgorbini, P. Rubiolo, C. Bicchi
"Conventional and enantioselective gas chromatography with microfabricated planar columns for analysis of real-world samples of plant volatile fraction"
 Journal of chromatography, Volume 1429 (2016) Page(s) 329-339
 doi: 10.1016/j.chroma.2015.12.037

- A. Hackner, W. Legner, G. Müller, E. Biavardi, E. Dalcanale, S. Zampolli, **I. Elmi**, G.C. Cardinali
"Surface ionization detection of amine containing drugs"
 Sensors and Actuators B: Chemical, Volume 185 (2013) Page(s) 771–776
 doi:10.1016/j.snb.2012.09.030
- F. Rastrello, P. Placidi, A. Scorzoni, E. Cozzani, M. Messina, **I. Elmi**, S. Zampolli, G.C. Cardinali
"Thermal conductivity detector for gas chromatography: Very wide gain range acquisition system and experimental measurements"
 IEEE Transactions on Instrumentation and Measurement, Volume 62, Issue 5 (2013), Page(s) 974-981
 doi: 10.1109/TIM.2012.2236723
- F. Rastrello, P. Placidi, A. Scorzoni, E. Cozzani, M. Messina, **I. Elmi**, S. Zampolli, G.C. Cardinali
"Thermal conductivity detector compact Spice model based on experimental measurements and 3D simulations"
 Sensors and Actuators A: Physical, Volume 178, May 2012, Pages 49-56
 doi:10.1016/j.sna.2012.02.008
- L. Bissi, M. Ciccioni, P. Placidi, S. Zampolli, **I. Elmi** and A. Scorzoni
"A Programmable Interface Circuit for an Ultralow Power Gas Sensor"
 IEEE TRANSACTIONS ON INSTRUMENTATION AND MEASUREMENT, Volume 60, (2011), Page(s): 282-289
 doi: 10.1109/TIM.2010.2049182
- E. Espinosa, R. Ionescu, S. Zampolli, **I. Elmi**, G.C. Cardinali, E. Abad, R. Leghrib, J.L. Ramirez, X. Vilanova, E. Llobet
"Drop-coated sensing layers on ultra low power hotplates for an RFID flexible tag microlab"
 Sensors and Actuators B: Chemical, Volume 144, (2010), Page(s): 462-466
 doi: 10.1016/j.snb.2009.07.005
- P. Placidi, F. Rastrello, L. Abbt, A. Scorzoni, E. Cozzani, **I. Elmi**, S. Zampolli, G.C. Cardinali
"Thermal transient measurements of an ultra-low-power MOX sensor"
 Journal of Sensors, Volume 2010, (2010), Article number 493765
 doi: 10.1155/2010/493765
- S. Zampolli, **I. Elmi**, F. Mancarella, P. Betti, E. Dalcanale, G.C. Cardinali, M. Severi
"Real-time monitoring of sub-ppb concentrations of aromatic volatiles with a MEMS-enabled miniaturized gas-chromatograph"
 Sensors and Actuators B: Chemical, Volume 141, (2009), Page(s): 322-328
 doi: 10.1016/j.snb.2009.06.021
- I. Elmi**, S. Zampolli, E. Cozzani, F. Mancarella, G.C. Cardinali
"Development of ultra-low-power consumption MOX sensors with ppb-level VOC detection capabilities for emerging applications"
 Sensors and Actuators B: Chemical, Volume 135, (2008), Page(s): 342-351
 doi:10.1016/j.snb.2008.09.002
- I. Sayhan, A. Helwig, T. Becker, G. Müller, **I. Elmi**, S. Zampolli, M. Padilla, S. Marco
"Discontinuously operated metal oxide gas sensors for flexible tag microlab applications"
 IEEE Sensors Journal, Volume 8, Issue 2 (2008), Page(s) 176-181
 doi: 10.1109/JSEN.2007.912791
- I. Elmi**, S. Zampolli, G.C. Cardinali
"Optimization of a wafer-level process for the fabrication of highly reproducible thin-film MOX sensors"
 Sensors and Actuators B: Chemical, Volume 131, Issue 2 (2008), Page(s): 548–555
 doi:10.1016/j.snb.2007.12.033
- S. Zampolli, **I. Elmi**, E. Cozzani, G.C. Cardinali, A. Scorzoni, M. Ciccioni, S. Marco, F. Palacio, J.M. Gómez-Cama, I. Sayhan, T. Becker
"Ultra-low-power components for an RFID Tag with physical and chemical sensors"
 Microsystem Technologies, Volume 14, Issue 4-5, (2008), Pages 581-588
 doi: 10.1007/s00542-007-0444-8

	<p>E. Abad, S. Zampolli, S. Marco, A. Scorzoni, B. Mazzolai, A. Juarros, D. Gómez, I. Elmi, G.C. Cardinali, J. M. Gómez, F. Palacio, M. Cicioni, A. Mondini, T. Becker and I. Sayhan <i>"Flexible tag microlab development: Gas sensors integration in RFID flexible tags for food logistic"</i> Sensors and Actuators B: Chemical, Volume 127, Issue 1, (2007), Page(s): 2-7 doi:10.1016/j.snb.2007.07.007</p> <p>S. Zampolli, P. Betti, I. Elmi, and E. Dal canale <i>"A supramolecular approach to sub-ppb aromatic VOC detection in air"</i> Chemical Communications, RSC Publishing, Number 27, (2007), Page(s): 2790-2792 doi:10.1039/b703747c</p> <p>L. Bissi, P. Placidi, A. Scorzoni, I. Elmi and S. Zampolli <i>"Environmental Monitoring System compliant with the IEEE 1451 Standard and Featuring a Simplified Transducer Interface"</i> Sensors and Actuators A: Physical, Volume: 137, Issue: 1 (2007), Page(s):175-184, doi:10.1016/j.sna.2007.02.004</p> <p>S. Zampolli, I. Elmi, J. Stürmann, S. Nicoletti, L. Dori and G.C. Cardinali <i>"Selectivity enhancement of metal oxide gas sensors using a micromachined gas chromatographic column"</i> Sensors and Actuators B: Chemical, Elsevier, Volume: 105, Issue: 2 (2005), Page(s): 400-406 doi: 10.1016/j.snb.2004.06.036</p> <p>S. Zampolli, I. Elmi, F. Ahmed, M. Passini, G.C. Cardinali, S. Nicoletti and L. Dori <i>"An electronic nose based on solid state sensor arrays for low-cost indoor air quality monitoring applications"</i> Sensors and Actuators B: Chemical, Elsevier, Volume: 101, Issue: 1-2, (2004) Page(s): 39-46 doi: 10.1016/j.snb.2004.02.024</p> <p>A. Roncaglia, I. Elmi, L. Dori, M. Rudan <i>"Adaptive K-NN For the Detection of Air Pollutants With a Sensor Array"</i> Sensors Journal, IEEE, Volume: 4 Issue: 2, Apr. 2004, Page(s): 248-256</p> <p>S. Nicoletti, S. Zampolli, I. Elmi, L. Dori, M. Severi: <i>"Use of different sensing materials and deposition techniques for thin-film sensors to increase sensitivity and selectivity"</i> Sensors Journal, IEEE, Volume: 3 Issue: 4, Aug. 2003, Page(s): 454-459</p> <p>L. Dori, S. Nicoletti, I. Elmi, A.R. Mastrogiacomo, L. Sampao, E. Pierini <i>"A Gas Chromatographic-like System for the Separation and Monitoring of Benzene, Toluene and Xylene Compounds at the ppb Level Using a Solid State Metal Oxide Gas Sensors"</i> Sensors and Materials Volume:12, Issue.3 (2000) Page(s): 163-174</p>
International conferences	Participation to 53 international conferences
PATENTS	<p>Inventor in 4 national and 5 international patents</p> <p>PCT/IB2020/055226 "A System for Chemical Analysis by means of Gas-Chromatographic Separation and Photoacoustic Spectroscopy of Samples Mixtures"</p> <p>PCT/IB2020/051046 "Miniaturized System for the Pre-Concentration and Subsequent (Gas-) Chromatographic Separation of Sample Mixtures"</p> <p>WO2013008191 "METHOD FOR MAKING A SILICON SEPARATION MICROCOLUMN FOR CHROMATOGRAPHY OR GAS CHROMATOGRAPHY"</p> <p>WO2014006648 "THERMAL CONDUCTIVITY DETECTOR (TCD) FOR APPLICATIONS IN FAST GAS- CHROMATOGRAPHIC (GC)"</p>

SCIENTIFIC COLLABORATIONS

International

- IT102019000008442** "Sistema di analisi chimica utilizzando separazione gascromatografica e spettrometria di miscele di campioni"
- IT102019000002519** "Sistema miniaturizzato per la pre-concentrazione e la successiva separazione (gas-)cromatografica di miscele di campioni"
- BO2004A000122** "Sensore a Stato solido e Metodo per la Realizzazione"
- BO2003A000680** "Apparecchiatura per misurare la quantità di idrocarburi volatili presenti nell'aria"
- FI2007A000160** "Dispositivo sensorizzato per il monitoraggio della qualità e della sicurezza di prodotti alimentari confezionati"

National

- ION-Science, Cambridge, UK (Dr. A.Witty)
- EADS, Corporate Research Centre, Munich, Germany (Dr. Th. Becker)
- UTRC (United Technology Research Centre), Hartford, USA (Dr. B. Woody)
- IMSAS, Universität Bremen, Germany (Prof. W. Lang)
- CNM – CSIC, Barcelona, Spain (Prof. J. Gutierrez)
- University of Barcelona (Prof. J.R. Morante)
- CNEA – Sensors and Microsystem Group, Argentina (Prof. A. Lamagna)
- Dip. di Chimica Organica ed Industriale, Università di Parma (Prof. E. Dalcanale)
- DIEI, Università Perugia (Prof. A.Scorzoni)
- Dip. di Scienza e Tecnologie del Farmaco, Università di Torino (Prof. C. Bicchi)
- ISOF-CNR (Dr.ssa Manuela Melucci)
- CRIM-Lab Scuola Superiore Sant'Anna, Pisa (Dr.ssa B. Mazzolai)

San Benedetto Val di Sambro, li 28/08/2023



Elmi Ivan

Consenso al trattamento dei dati personali, legge 675/96:

In riferimento alla legge 675/96 sulla tutela del trattamento dei dati personali, autorizzo espressamente l'utilizzo dei dati personali e professionali riportati nel curriculum per le esigenze di selezione e valutazione.

San Benedetto Val di Sambro , li 28/08/2023

