Poster Session 1 (MPS1) : Monday 3/17/14 16:00 - 17:30 hs [Meeting Point]

Poster	Topic	Title	Author Name	Abstract	University/Company	Countries
MPS-T1-15	# 1 Chemical and Biochemical Sensors	Beyond Nernst Response of Sensitivity Enhancement on EIS pH Sensing Device by Multi-Programming.	Aurelien Dominguez[1,2], [2,3]Yi-Ting Lin, [1,2]Chao-Sung Lai*	In this study, the effect of different stressing methods on an Electrolyte-Insulator-Semiconductor structure for pH sensing has been studied. The EIS device uses an intermediate trapping storage layer of silicon nitride for the high density of traps of the material. The stressing method consists in using a low field of opposite polarity to the initial stress field to have a relaxation effect on the neutral trap created during the original process [2-3] and to repeat the programming at regular interval of time. With this method we observeD a successful trapping of holes through a negative shift of the flatband voltage and an enhancement of the sensitivity beyond Nernst response, more than THE theoretical ideal case, from 30 mV/pH to 80 mV/pH. In the meantime, by multiple times programming, a great stability with double sensitivity enhancement and variation within ±2% on the sensitivity measurement suggests that this method meets the prerequisite for medical application.	1departement of electrical engineering, GRENOBLE INP-PHELMA Grenoble, France 2Department of Electronic Engineering, Chang-Gung University, Taoyuan, Taiwan 3Biosensor Group, Biomedical Engineering Research Center, Chang Gung University, Taoyuan, Taiwan *Phone: +886-3-2118800 ext. 5607	Taiwan
MPS-T1-12	# 1 Chemical and Biochemical Sensors	Fabrication and properties of SnO2 thin film sensor prepared by ion sputtering for the detection of chemical agent simulants.	ByungWook Hwang[1], SooChool Lee[2], SeongYeol Kim[1], Suk Yong Jung[2], Duk Dong Lee[3], Jae Chang Kim[1,*]	Sensing behaviors of SnO2-based thin film sensors and thick film sensors prepared byion sputtering and screen printing methods, respectively,were investigated for the detection of DPGME (Di(Propylene) Glycol Methyl Ether). The SnO2 thick film sensorshowed a low sensor response of about 1.3for the detection of 0.1 ppm at 350°C,whilethe SnO2nanorodthin film sensor showed a higher sensor response of about 2.1, as well as excellent recovery properties. The new regenerable SnO2nanorod thin film sensor developed in this study has great potential for the detection of DPGME of ppb level. In thisstudy, we will discuss effects of preparation methods and promoterson the sensing properties of SnO2 thin film sensor for DPGME gas.	1Department of Chemical Engineering, Kyungpook National University, Daegu 702-701, Republic of Korea 2Research Institute of Advanced Energy Technology, Kyungpook National University, Daegu 702-701, Republic of Korea 3School of Electrical Engineering and Computer Science,Kyungpook National University, Daegu 702-701, Republic of Korea	Republic of Korea
MPS-T1-13	# 1 Chemical and Biochemical Sensors	Multiplexed Gas Sensor Based on Heterogeneous Nanostructure Array Fabricated by using Localized Hydrothermal and Wet Chemical Reaction	Daejong Yang[1] and Inkyu Park[1,*]	We fabricated an array of three kinds of metal oxide nanomaterials for a mobile gas sensor. The nanostructures were locally synthesized and integrated by using novel method combining localized hydrothermal and liquid phase deposition (LPD) methods which are simple and inexpensive processes. The device could detect several tens ppm and sub-ppm level of CO and NO2 gases, respectively.	1 Mechanical Engineering Department & KI for the NanoCentury, KAIST, Daejeon, South Korea	South Korea
MPS-T1-21	# 1 Chemical and Biochemical Sensors	The effect to gas response of monolayer iron oxide film grown on platinum-based sensing layers	Hossein Fashandi[1], Jens Eriksson[1], Markus Soldemo[2], Jonas Weissenrieder[2], Anita Lloyd Spetz[1] and Mike Andersson[1]	We investigate the characteristics of monolayer iron oxide grown on platinum as a sensing layer in chemical gas sensors. The sensors are designed as capacitors on oxidized silicon carbide substrates (SiO2) in which the sensing layer plays the role of one charge plate. The sensitivity of the aforementioned sensing layer was studied towards oxygen, hydrogen, ammonia, nitric oxides and carbon monoxide and the results were compared with traditional platinum based sensors.	1.Applied sensor science, IFM, Linköping University, Linköping, Sweden. 2 Material physics, Royal Institute of Technology (KTH), Stockholm, Sweden.	Sweden
MPS-T1-9	# 1 Chemical and Biochemical Sensors	Multi-ion sensitivity of AgGeSe ion selective electrodes	J.M. Conde Garrido[1], J.M. Silveyra[1], M.A. Ureña[1], B.Arcondo[1]	Chalcogenide glasses have successfully been applied as sensitive membranes of ion selective electrodes (ISEs) for many decades [1].In particular, they have shown to possess excellent properties for the development of multi-sensor systems like electronic tongues [2], [3], [4]. Thekey component needed in the fabrication of this multi-sensor systems is a cross-sensitivity (various degree of sensitivities to the presence ofdifferent ions)[5]. In previous works, ISEs with membranes of the system AgGeSe have shown to have good sensitivity to Ag+ and Cu2+ ions [6], [7]. In the present work, ISEs with either bulk or thin film membranes of composition AgX(Ge0.25Se0.75)100-X (10 < X < 25) were prepared. The bulk membranes were prepared by the melt-quenching technique and the thin films membraneswere prepared by pulsed laser deposition.The sensitivities of the ISEs were measured against several ions: Pb2+, Cd2+, Cr3+, Mg2+, K+ and Fe3+. The electrodes showed an important response to the presence of Pb2+ and Fe3+ ions, a lowresponse to the presence of Cd2+ and Cr3+ ions and a total lack of response to the presence of Mg2+ and K+.These results lead to the conclusion that electrodes with	1 Laboratorio de Sólidos Amorfos, INTECIN, Facultad de Ingeniería, Universidad de Buenos Aires – CONICET. Paseo Colón 850, (1063) Buenos Aires, Argentina	Argentina
MPS-T1-23	# 1 Chemical and Biochemical Sensors	Highly NO2 sensitive nitrogen- and caesium-doped graphene oxide based conductometric devices operating at room temperature	Mahnaz Shafiei*[1,2], Carlo Pilotto[1], Marco Notoriani[1], Dilini Galpaya[3], Muhammad Z. Ahmad[2,3], Wojtek Wlodarski[2], Cheng Yan[1], Nunzio Motta[1]	An investigation on NO2 sensing properties of novel conductometric devices based on nitrogen (N) and caesium (Cs) doped graphene oxide (GO) is reported. The GO was synthesized by chemical treatment of graphite through oxidation and then was doped with N and Cs by thermal solid-state reaction method. The sensitivity of as-prepared, N- and Cs-doped GO was studied by measuring the change of their resistivity upon exposure to NO2 at room temperature. The as-prepared GO sensor did not show any response to the target gas; while both N- and Cs-doped GO sensors exhibited a significant high sensitivity to NO2, as low concentration as 1 ppm.	1.School of Chemistry, Physics and Mechanical Engineering, QUT University, Brisbane, QLD, Australia 2School of Electrical and Computer Engineering, RMIT University, Melbourne, Victoria, Australia 3Mechanization and Automation Research Center, Malaysian Agricultural Research Development Institute (MARDI), Serdang, Selangor, Malaysia	Australia , Malaysia
MPS-T1-26	# 1 Chemical and Biochemical Sensors	Amine-functionalized silica thin films loaded with Ag nanoparticles to LSPR sensors	María Virginia Roldán, Nora Pellegri	The objective of this work is to obtain amine-functionalized silica thin films loaded with silver nanoparticles to LSPR sensors. With this purpose we obtained silver nanoparticles stabilized by aminosilanes. We studied the sensitivity of this metal nanoparticles respect to environmental changes using heavy metals as models. Then, we obtained SiO2 thin films containing silver nanoparticles by sol-gel. Also, through this process we functionalize simultaneously the surface of the thin film with amine groups. Amines are useful to introduce in a following step organic compounds of biological interest to obtain selectivity in complex samples as biological fluids.	Laboratorio de Materiales Cerámicos, IFIR-CONICET, FCEIA-UNR, Pellegrini 250, Rosario, Argentina	Argentina
MPS-T1-10	# 1 Chemical and Biochemical Sensors	Fluorescence emission from metal-organic frameworks to differentiate mixed solutions of aromatic hydrocarbons	Matthew Myers, Anna Podolska, Charles Heath, Bobby Pejcic, Adrian Trinchi and Ivan Cole	Previously, Takashima et al. have demonstrated that a zinc-based metal-organic framework with a 1,4,5,8-naphthalenediimide (NDI) moiety (see Fig. 1) as a fluorescing species pure samples of aromatic hydrocarbons (e.g. benzene, toluene and p-xylene) can be differentiated based on the wavelength of the excimer emission derived from the interaction with the diimide [1]. This particular metal-organic framework is entangled and undergoes a structural rearrangement upon binding of aromatic compounds thus it adopts a confirmation that maximizes the binding interaction. In this study, we examine the behavior of mixtures of aromatic hydrocarbons and show that the resulting emission wavelength changes non-linearly with changes in solution composition. We discuss the implications of this result in the context of chemical sensing.	Commonwealth Science and Industrial Research Organization, Perth, WA Australia	Australia
MPS-T1-1	# 1 Chemical and Biochemical Sensors	Detection of Heavy Metal Compounds Using a Novel Inkjet Printed Surface Enhanced Raman Spectroscopy (SERS) Substrate Based on Metallic Triangular Nano Structures	Morteza Rezaei, Payam Aminayi, Ali Eshkeiti, Binu B. Narakathu, Massood Z. Atashbar	A novel surface enhanced Raman spectroscopy (SERS) substrate was fabricated by inkjet printing metallic silver (Ag) nanoparticle (NP) ink on flexible polyethylene terephthalate (PET) film. The printed Ag was patterned to form triangular nano structures. The capability of the printed substrate to detect various heavy metal compounds, based on SERS, was demonstrated. An enhancement factor of seven orders of magnitude, in the intensity of the Raman spectra, was achieved for mercury sulphide (HgS) on the printed Ag when compared to that of HgS on bare PET. This response demonstrated the feasibility of the SERS substrate to be used for the detection of toxic heavy metals. The response of the printed SERS substrate is analyzed and presented in this paper.	Western Michigan University, 4601 Campus Drive, Kalamazoo, Michigan 49008, USA	USA
MPS-T1-20	# 1 Chemical and Biochemical Sensors	Stability and sensitivity of doped polyaniline films for gas sensors	O.M. Ivanova, S.A. Krutovertsev	The problem of long-time stability of chemical sensors sensitive layers remains important factor. It is usual that decision of this task results in sensitivity change and often makes it worse. The properties of thin polyaniline films doped with Dawson-type heteropolycompounds at room temperature in clean air and in air containing ammonia were examined. It has been shown that heteropolyanion composition and cation type have a considerable influence on sensor characteristics of doped films. The study shows that the measurement conditions affect markedly the behavior of sensors, which can be improved by choosing of the right procedure of measurements which takes into account of applied voltage, environment temperature and	JSC "Ecological sensors and systems", Zelenograd, Moscow, pass.4922, 124460, Russia	Russia
MPS-T1-18	# 1 Chemical and Biochemical Sensors	Sensitivity and selectivity of doped silica films to amines in air	O.M. Ivanova, S.A. Krutovertsev, A.E. Tarasova, L.S. Krutovertseva	This paper examines adsorption properties of nanostructured silica films doped with molybdenum containing polyoxometalates of 18th row and obtained by sol-gel route. Sol-gel method enables to produce nanostructured sorbent films that have a developed specific surface with many active centers and high adsorption. Moreover catalytic redox activity of polyoxometalates introduces selectivity aspect in gas detection. Polyoxometalate addition into silica film results in stabilization of film mass and markedly changes of sorption characteristics. The introduction of synthesized heteropolycompound with composition of Co3P2Mo18O62 into silica film results in selectivity and high sensitivity to ammonia. It is observed significant sensitivity to aliphatic amines, and high selectivity is shown to hydrazine.	JSC "Ecological sensors and systems", Zelenograd, Moscow, pass.4922, 124460, Russia	Russia
MPS-T1-8	# 1 Chemical and Biochemical Sensors	Room Temperature Gas Sensor based on Single Wall Carbon Nanotubes Solid Composite Pellets	Paolo N. Catalano[1,2,3*], Diana C. Delgado González[2], Juan Bonaparte[1], Juan Vorobioff[1,3], Hebe A. Durán[1,2,3,4], Alberto Lamagna[1,3,4] and Martin G. Bellino[1,2,3].	Simple and robust room temperature gas sensors based on single wall carbon nanotubes solid composite pellets were fabricated by mechanical compression and were morphologically characterized by SEM. At room temperature these sensors exhibit an ohmic I-V response and show high sensitivity to different concentrations of ethanol. Results are important for low cost and low power consumption gas sensor fabrication.	1. Comisión Nacional de Energía Atómica, Av. General Paz 1499, San Martín (1650), Buenos Aires, Argentina. 2 Consejo Nacional de Investigaciones Científicas y Técnicas, Av. Rivadavia 1917 (1033), Ciudad de Buenos Aires, Argentina. 3 Instituto de Nanociencia y Nanotecnología-CNEA, Av. General Paz 1499, San Martín (1650), Buenos Aires, Argentina. 4 Universidad Nacional de San Martín, Martín de Irigoyen Nº 3100, San Martín (1650), Buenos Aires, Argentina.	Argentina
MPS-T1-11	# 1 Chemical and Biochemical Sensors	Acetone gas sensor based on Y-doped ZnO electrospun nanofibers	Peng Yu[a], Jing Wang[a,c*], Hai-ying Du[a,b], Peng-Jun Yao[a,c], Jiang-li Tian[a], Xiao-gan Li[a], Wei Wu[c]	Pure and Y-doped (3 at%, 6 at%, and 9 at%) ZnO nanofibers were synthesized using the electrospinning method and characterized by X-ray powder diffraction (XRD), scanning electron microscopy (SEM) and energy dispersive X-ray spectroscopy (EDX), respectively. It is found that Y doping does not change the morphology and crystal structures of the nanofibers. Actons sensing properties of the sensors based on the pure and Y-doping ZnO nanofibers were investigated. The acetone sensing properties of ZnO nanofibers are effectively improved by Y doping: 3 at% Y-doping ZnO nanofibers show a maxinum response value to acetone gas and good selectivity to acetone in the interfere gases of ammonia, formaldehyde, toluene, and methanol. The sensing mechanism was briefly discussed.	a School of Electronic Science and Technology, Dalian University of Technology, Dalian 116023, PR China b Department of Electromechanical Engineering and Information, Dalian Nationalities University, Dalian 116600, PR China c School of Educational Technology, Shenyang Normal University, Shenyang 110000, PR China d School of Mathematical Sciences, Dalian University of Technology, Dalian 116023, PR China	China
MPS-T1-2	# 1 Chemical and Biochemical Sensors	TiO_2 nanoporous arrays and their gas sensing at room temperature	Perillo P.M.[1], Rodríguez D. F.[1], Boggio N.B.[1,2]	Thin films of nanostructured titania were fabricated via electrochemical anodization method on silicon substrates. The morphological characterization by means of X-ray diffraction (XRD), scanning electronic microscope (SEM) and atomic force microscope (AFM) was realized. The sensor fabricated from these nanoporous material exhibits a good response to different volatile compounds at room temperature.	1 Comisión Nacional de Energía Atómica, CAC, Av. Gral. Paz 1499 (1650) Bs As., Argentina. 2Consejo Nacional de Investigaciones Científicas y Técnicas, Av. Rivadavia 1917 (1033) Bs As., Argentina	Argentina
MPS-T1-25	# 1 Chemical and Biochemical Sensors	Synthesis and properties of nanostructured materials based on tin dioxide from new volatile precursors	Popov V.S., Sevastyanov V.G., Kuznetsov N.T	Tin dioxide thin films with different morphology were obtained by atmospheric pressure chemical vapor deposition (APCVD) on silicon and alumina substrates. As a precursor used volatile tin compounds with crown ethers: [Sn(H2O)2C4H4(18-Crown-6)], [Sn(18-Crown-6)Cl4], [Sn(H2O)2C4]•(15-Crown-5); and [Sn(C5HO2F6)2] (Tin (II) hexafluoroacetylacetonate), [Sn(C5H4O2F3)2] (Tin (II) trifluoroacetylacetonate). The composition and morphology of coatings on different substrates were studied by atomic force microscopy (AFM), scanning electron microscopy (SEM), X-ray diffraction (XRD), Energy-Dispersive X-ray Spectrometry (EDX). The influence of the annealing conditions on the resistance of the coatings were studied. The measurements of the resistance of coatings in different atmosphere were obtained.	Kurnakov Institute of General and Inorganic Chemistry of the Russian Academy of Sciences, Leninskij prosp., 31, Moscow, 119991, Russia	Russia
MPS-T1-17	# 1 Chemical and Biochemical Sensors	A novel non-enzymatic glucose biosensor based on carbon nanotubes decorated with Fe_3O_4 nanoparticles	S. Masoomi-Godarzi[a], A. A. Khodadadi[a], M.Vesali-Naseh[a], Y. Mortazavi[a]	A novel enzyme-free and direct electrochemical glucose biosensor using iron oxide nanoparticles-decorated MWCNTs modified glassy carbon electrode was fabricated. The MWCNTs were synthesized by catalytic chemical vapor deposition and functionalized in HNO3. The morphology of the samples was characterized with SEM, XRD and FTIR. The electrocatalytic activity of the modified electrode toward glucose oxidation was evaluated by cyclic voltammetery and ammpmetry in 0.05 M phosphate buffer solution at pH 7.0. The prepared electrode showed a linear behavior in the range of 0.5-7.0 mM with a high sensitivity of 238.7 μA mM-1 cm-2 and a low detection limit of 15.0 μM at S/N=3.0.The results showed that the functionalized MWCNTs significantly enhance the catalytic behavior of Fe3O4 for glucose oxidation.	Catalysis and Nanostructured Materials Laboratorya, School of Chemical Engineering, College of Engineering, University of Tehran, Tehran, Iran.	Iran
MPS-T1-16	# 1 Chemical and Biochemical Sensors	Highly Sensitive Carbon Nanotubes-SnO2 Nanocomposite Sensor for Acetone Detection	S. Salehi, E. Nikan, A.A. Khodadadi, Y. Mortazavi	Multiwall carbon nanotubes (MWCNTs)-SnO2 nanocomposite sensors were fabricated using ultrasonic-assisted deposition–precipitation method and used for detection of low concentrations of acetone. The sensors responses to ppm and sub-ppm level of acetone were measured in a flow system at various temperatures. The addition of MWCNTs dramatically enhances the sensor response to acetone.	School of Chemical Engineering, College of Engineering, University of Tehran, Tehran, Iran	Iran
MPS-T1-19	# 1 Chemical and Biochemical Sensors	Sensor system for real-time *in situ* monitoring of (bio)degradation of polymers	S. Schusser[a,b], M. Bäcker[a,b], M. Krischer[a], L. Wenzel[a], M. Leinhos[a,b], A. Poghossian[a,b,*], P.Wagner[c], M.J. Schöning[a,b]	novel sensor system is introduced featuring real-time in situ monitoring of the degradation process of biopolymers. The system combines an array of polymer-modified capacitive field-effect sensors and is able for simultaneous characterization of multiple biopolymers in different degradation media. The time-dependent change in the impedance of polymers under investigation has been used as an indicator to A quantify the progress of the degradation process. This novel technique has been tested to monitor the degradation of thin poly(lactic acid) films in medium with different pH values and concentration of the enzyme lipase.	a Institute of Nano- and Biotechnologies (INB), FH Aachen, 52428 Jülich, Germany b Peter Grünberg Institute (PGI-8), Research Centre Jülich GmbH, 52525 Jülich, Germany c Institute for Materials Research, Hasselt University, 3590 Diepenbeek, Belgium	Germany, Belgium

MPS-T1-22	**# 1 Chemical and Biochemical Sensors**	**The influence of the underlying layer for the sensing behavior of Pt/Au based carbon monoxide work function sensors for hydrogen atmospheres.**	**S. Simon (a), R. Marjunya (a,b), Ch. Wilbertz (c), W. Hansch (a).**	A work function sensor (FG-FET) with a platinum/gold alloy as sensitive layer can detect a few ppm carbon monoxide in a hydrogen atmosphere. This sensor is useful to regulate a preferential oxidation stage in a fuel cell reformer which removes carbon monoxide in the hydrogen gas. The underlying layer has a strong influence for the sensing behavior of the Pt/Au layers. With different interlayers the d band center of the transition metal alloy PtAu is increased or decreased. This leads to different bond strengths of CO and H2 and therefore to different sensing properties. Aluminium, iron, platinum, tin and titanium as underlying layers are investigated and the different reactions of the Pt/Au layers to carbon monoxide are presented.	(a) University of the Bundeswehr Munich – Institute of Physics, Werner-Heisenberg-Weg 39, 85577 Neubiberg, Germany (b) University of Lampung – Department of Physics, Jl. Prof. Dr. Soemantri Brodjonegoro 1, 35145 Bandar Lampung, Indonesia (c) Micronas GmbH, Hans-Bunte-Straße 19, 79108 Freiburg, Germany	Germany
MPS-T1-24	**# 1 Chemical and Biochemical Sensors**	**Sensitivity Improvement of Pt-based Layer as Work Function Based Sensor for Carbon Monoxide in Air at Room Temperature**	**R. Marjunya[1,2], S. Simon[1], Ch. Wilbertz[2], W. Hansch[1]**	In this talk, an investigation is presented to develop a Pt-based sensitive layer for a work function based sensor to detect carbon monoxide in air at room temperature. The current results reveal that ternary alloy Pt80Au14Ti6 is giving good signals. Oxygen occupation of surface adsorption sites is responsible for the vanishing of the signals after 24 hours in air. However, the sensitivity to carbon monoxide can be refreshed by annealing at 170oC for 10 minutes in air. There are cross sensitivities to NH3, NO2 and humidity which have to be handled in application.	1.Institut für Physik, Universität der Bundeswehr München, Werner-Heisenberg-Weg 39, 85577 Neubiberg, Germany 2.Micronas GmbH, Hans-Bunte Strasse 19, 79108 Freiburg, Germany 3.Department of Physics, University of Lampung, Jl. Prof. Dr. Soemantri Brodjonegoro 1, 35145 Bandar Lampung, Indonesia	Germany , Indonesia
MPS-T1-3	**# 1 Chemical and Biochemical Sensors**	**Detection of 2,4-Dinitrotoluene (DNT) Using Gravure Printed Surface Enhanced Raman Spectroscopy (SERS) Flexible Substrate**	**Sepehr Emamiam, Ali Eshkeiti, Binu B. Narakathu, Avuthu S.G. Reddy, Massood Z. Atashbar**	An efficient surface enhanced Raman spectroscopy (SERS) substrate was successfully fabricated by gravure printing a thin film of silver (Ag) nanoparticle ink on flexible polyethylene terephthalate (PET) sheet. The feasibility of the printed SERS substrate for detecting explosive organic compounds such as 2,4-dinitrotoluene (DNT), which is well known as a precursor to trinitrotoluene (TNT), was demonstrated. The SERS based response of the printed substrate demonstrated an enhanced Raman signal when compared to target molecules adsorbed on bare PET. The response demonstrated the efficiency of the novel SERS substrate to be used in applications for detection of explosive organic compounds.	Western Michigan University, 4601 Campus drive, B-236, Kalamazoo, MI-49008, USA	USA
MPS-T1-4	**# 1 Chemical and Biochemical Sensors**	**Application of oxo-manganese complex immobilized on ion-exchange polymeric film as biomimetic sensor for nitrite ions**	**W. B. S. Machini, D. N. David-Parra and M. F. S. Teixeira**	A biomimetic sensor is proposed as a promising new analytical method for determination of nitrite ions (NO_2^-). The sensor was prepared by modifying a glassy carbon electrode surface with a Nafion® membrane and [Mn3O4(phen)4(H2O)2]4+ (phen = 1,10- phenanthroline). The voltammetric measurements were performed in absence and presence of nitrite ions. A plot of the anodic current versus the nitrite ions concentration for voltammetry at the sensor was linear in the concentration range from 2.49 × 10-6 to 9.90 × 10-6 mol L-1 with detection limit of 6.50 × 10-6 mol L-1 and Michaelis-Menten constant of 0.45 μmol L-1. The proposed electrode is useful for the quality control and routine analysis of nitrite ions.	Department of Physics, Chemistry and Biology, Faculty of Science and Technology, São Paulo State University (UNESP), Roberto Simonsen Street, 305, Postcode 19060-900, Presidente Prudente, SP, Brazil.	Brazil
MPS-T1-5	**# 1 Chemical and Biochemical Sensors**	**Electrical properties analysis of $BaSnO_3$ powders synthesized by Pechini and its possible use as gas sensor**	**Y. H. Ochoa[1], M. Ponce[2], F. Schipani[2], J.E.Rodriguez-Páez[1]**	In this work, we synthesized BaSnO3 usingPechini method. We used this mixed oxide to shape ceramics pieces utilized slip casting process. A suspension with 57.6% in solids was forming mixed the powder ceramic synthesized with water and to guarantee its stability we added several PAA drops as deflocculant. The slurry was poured into a moldto obtain a green ceramics pieces with parallelogram form. Theseblocks weresintered to1350, 1450 y 1500°C during 3 hours. Finally, the sampleselectrical behaviorwas studied at 300°C and in air atmosphere. The results showed that the obtained BaSnO3particles could be used to conformgas sensor films. The grains present overlapped intergranular potential barriers.	1Grupo CYTEMAC, Universidad del Cauca. Popayán – Colombia. 2INTEMA, Universidad Nacional de Mar del Plata. Mar del Plata - Argentina	Colombia , Argentina
MPS-T1-6	**# 1 Chemical and Biochemical Sensors**	**Effects of $BaSnO_3$ synthesis method on the gas sensor ability**	**Y. H. Ochoa[1], M. Ponce[2], F. Schipani[2], J. E.Rodriguez-Páez[1]**	In this work, we synthesized BaSnO3 using two chemical methods: controlled precipitation and Pechini. Later, we determined the better condition to obtain the mixed oxides. This powder was mix with glycerin obtained a paste that we put over alumina substrate. With the obtained powders thin films were prepared using the screen printing technique. The films were thermally treated up to 100°C during 12 hours. Finally, these treated films were tested to determine their ability as gassensor. In order to analyze the films electrical behaviors, samples were exposed to O2 and CO atmospheres. The results showed that the film shaped with powders obtained by Pechini method presented better response as CO sensor.	1Grupo CYTEMAC, Universidad del Cauca. Popayán – Colombia. 2INTEMA, Universidad Nacional de Mar del Plata. Mar del Plata - Argentina	Colombia , Argentina
MPS-T1-7	**# 1 Chemical and Biochemical Sensors**	**Heavy Metal Detection using Shear Horizontal Surface Acoustic Wave (SH-SAW) Sensors**	**Zeinab Ramshani, Binu B. Narakathu, Avuthu S. G. Reddy, Massood Z. Atashbar**	In this study, a liquid sensing system was successfully developed for the detection of toxic heavy metal compounds. The system consists of a guided shear horizontal mode surface acoustic wave (SH-SAW) sensor with 64° YX-LiNbO3 based piezoelectric substrate and gold (Au) interdigitated electrodes (IDE). A flow cell, with a reservoir volume of 3 µl, which employs inlet and outlet ports for the microfluidic chamber and polydimethylsiloxane (PDMS) based microfluidic channels, was also designed and fabricated using acrylic material. The effect of varying concentrations of test analytes on the resonant frequency, as the SAW propagates through the substrate between input and output IDEs, was investigated. This frequency based response of the SAW sensor towards cadmium sulfide (CdS) demonstrated the capability of the system to detect picomolar level concentrations.	Western Michigan University, 4601 Campus drive, B-236, Kalamazoo, MI-49008, USA	USA
MPS-T1-27	**# 1 Chemical and Biochemical Sensors**	**Inkjet-printed Organic Field Effect Transistors functionalised with Odorant Binding Proteins for the detection of Volatile Organic Compounds.**	**Giorgio Mattana[1], Maria Daniela Angione[2], Francisco Molina-López[1], Krishna Persaud[2], Danick Briand[1], Nico F. de Rooij[1]**	This paper presents a novel approach for the detection of Volatile Organic Compounds (VOCs) in which small biological molecules, namely Odorant Binding Proteins (OBPs), are incorporated for the first time into the gate structure of inkjet-printed Organic Field Effect Transistors (OFETs). The highly specific chemo-physical interaction between OBPs and certain chemical species determines a modulation of the OFETs drain-source current, thus proving that OFETs can be successfully used as transducers in the field of gas detection. The high selectivity of OBPs towards specific chemical species combined with the low production costs associated to Printed Electronics (PE) suggest the possibility to produce selective, low cost and reusable gas sensors.	1. Ecole Polytechnique Fédérale de Lausanne (EPFL), Institute of Microengineering (IMT), Sensors, Actuators and Microsystems Laboratory (SAMLAB), 2002 Neuchâtel, Switzerland 2. School of Chemical Engineering and Analytical Science, The University of Manchester, M13 9PL, Manchester, UK	Switzerland , UK
MPS-T1-14	**# 1 Chemical and Biochemical Sensors**	**Tungsten trioxide architectures with hexagon shapes: microwave-assisted hydrothermal synthesis and ethanol sensing properties.**	**Zhenyu Wang, Xiaobiao Cui, yan Xiao, Yuan Gao, Peng Sun, Geyu Lu***	Tungsten trioxide (WO3) architectures with hexagon shapes were synthesized via a microwave-assisted hydrothermal method and a subsequent heat treatment. The as-prepared materials were characterized by X-Ray powder diffraction analysis (XRD) and scanning electron microscopy (SEM). The results revealed that, after heat treatment, the as-prepared material was transformed from WO3×(H2O) 0.33 to pure WO3. The WO3 architectures were regular hexagon shapes with a side length of 2 μm, and their building blocks were nanoplates. A gas sensor based on the WO3 architectures was fabricated and tested. The testing results exhibited that the sensor showed relatively high response and good repeatability to ethanol vapors.	State Key Laboratory on Integrated Optoelectronics, College of Electronic Science and Engineering, Jilin University, 2699 Qianjin Street, Changchun 130012, People's Republic of China.	People's Republic of China
MPS-T2-1	**# 2 Technologies for Chemical and Biochemical Sensing**	**Synthesis of ZnO nanomaterials by a simple route for gas sensing applications**	**F. Chávez[1], G. F. Pérez-Sánchez[1*], O. Goiz[2], P. Zaca[1], C. Felipe[4], R. Peña-Sierra[4]**	Zinc Oxide nanomaterials were synthesized by a simple route for application as gas sensor device. The route comprises two steps; first, Closed Space Sublimation technique is employed to produce zinc structures onto quartz glass substrate and second, a thermal oxidation treatment produces ZnO material. The zinc deposition is carried out at low temperatures as 325 °C during five to ten minutes and the oxidant treatment is carried out at 400 °C during two to four hours in air. The gas sensor was fabricated by printing gold electrodes over these ZnO nanomaterials and tested towards H2 and NO2 gas at low temperatures.	1 Physical-Chemical Materials Department, ICUAP-BUAP, Puebla, 72000, México. 2 Departamento de Territorio y Ambiente, CIIEMAD-IPN, México D.F., 07340, México. 3 Departamento de Biosciencias e Ingeniería, CIIEMAD-IPN, México D.F., 07340, México. 4 Electrical Engineering Department, CINVESTAV-IPN, México D.F., 07360, México.	México
MPS-T2-2	**# 2 Technologies for Chemical and Biochemical Sensing**	**Nanocrystalline SnO2 Film Prepared by the Aqueous Sol-Gel Method and Its Application as Sensing Films of the SAW H2S Sensor**	**Wei Luo, Qiuyun Fu, Dongxiang Zhou, Jianfeng Deng, Yunxiang Hu, Shuping Gong, Zhiping Zheng**	SAW gas sensor employing SnO2 as the sensitive film showed good gas sensing properties. But the conventional sol-gel method is unfit for depositing SnO2 films on SAW substrates as the sol can corrode the electrodes made of conventional metals due to its strong acidity. In this paper, a new aqueous sol-gel method was adopted to deposit SnO2 films on SAW device substrate with little corrosion of electrodes. The surface morphology and microstructure of the prepared films were investigated and the H2S sensing properties of the films were studied. The results showed that both high sensitivity and good selectivity for H2S detection have been achieved. The SAW gas sensors had a good performance for detecting H2S at room temperature.	School of Optical and Electronic Information, Huazhong University of Science and Technology, 1037 Luoyu Road, Hongshan District, 430074, Wuhan, Hubei, China P. R.	China P.R
MPS-T2-3	**# 2 Technologies for Chemical and Biochemical Sensing**	**Preparation of ordered ZnO films by RF sputtering and their H2S gas sensing properties**	**Qiuyun Fu, Junyong Xie, Wei Luo, Shuping Gong, Yunxiang Hu, Zhiping Zheng, Dongxiang Zhou**	Nanostructured ZnO is a promising gas sensing material in many applications. It has been employed as sensing film of surface acoustic wave gas sensor recently. The gas sensing properties have a tight relationship with the grain structure. The film with particular orientation may have a good gas sensing properties. In this paper, ZnO thin Films with different structure have been successfully prepared by RF magnetron sputtering on alumina substrate. The result of XRD spectra indicates that one of the prepared ZnO films have a (002) ordered structure. The sensitivity towards H2S gas was increased by optimizing parameters including film thickness and operating temperature.	School of Optical and Electronic Information, Huazhong University of Science and Technology, 1037 Luoyu Road, Hongshan District, 430074, Wuhan, Hubei, China P. R.	China P.R
MPS-T2-4	**# 2 Technologies for Chemical and Biochemical Sensing**	**A method for improving consistency in SPR array detection**	**Deng Shijie,Wang Peng, Ding Lili, Dou Fuyin, Yu Xinglong**	Low spot-to-spot variability is desired for the high-throughput detection of biomolecular interaction. Based on theoretical analysis, an optimized flow cell with slanted top wall is proposed to reduce the spot-to-spot variability. Goat-anti-rabbit IgG and rabbit IgG interaction experiments on a home-built surface plasmon resonance imaging system were performed using both the optimized and the conventional flow cells. Experimental results demonstrated that the consistency of binding responses obtained from the optimized flow cell had increased by 43.4%.	Dept. of Precision Instruments, Tsinghua University, Beijing 100084, P. R. China	P.R China
MPS-T2-5	**# 2 Technologies for Chemical and Biochemical Sensing**	**Spectroscopic ellipsometry: Characterisation of gold nano-structures and biosensing applications**	**A. Nabok, A. Tsargorodska**	Spectroscopic ellipsometry (SE) is a powerful optical analytical tool commonly used for characterisation of thin films. Here we report on the application of SE for characterisation of different gold nanostructures, particularly gold nano-islands formed on solid surfaces. The main goal of this research was to optimise the technology of gold nanostructures for biosensing applications using the methods of LSP (localised surface plasmons) and SERS (surface-enhanced Raman scattering)	Sheffield Hallam University, Materials and Engineering Research Institute Sheffield, S1 1WB, UK	United Kingdom
MPS-T2-6	**# 2 Technologies for Chemical and Biochemical Sensing**	**Bacteria-based sensor array for detection of radionuclides and heavy metals in water**	**A. Nabok[C], M. Al-Shanawa[1], O.N. Oliveira J.[3]**	This work targets the development of novel sensors for monitoring environmental pollutions, particularly radio-nuclides and heavy metals. The main idea was to use microorganisms (bacteria) which are known to be inhibited by g-radiation (released by some radionuclides) and heavy metals. Such inhibition sensors are obviously not specific; so the identification of pollutants can be achieved using sensor array principles. In this work, for the development of the inhibition sensor array, two types of bacteria were used, namely, Escherichia coli (E. coli) and Deinococcus radiodurans (D. radiodurans). Several optical methods as well as electrochemical DC and AC measurements were utilized, first, to establish a correlation between the live bacteria concentration and optical and electrical characteristics of bacteria samples, and secondly, to study the effect of g-radiation and heavy metals on the above bacteria.	1 Materials & Engineering Research Institute, Sheffield Hallam University, Sheffield, S1 1WB, UK 2 Biomedical Research Centre, Sheffield Hallam University, Sheffield, S1 1WB, UK 3 Institute of Physical Sciences, University of Sao Paulo, Sao Carlos, Brazil	United Kingdom, Brazil
MPS-T2-7	**# 2 Technologies for Chemical and Biochemical Sensing**	**A microwave-based method to monitor the ammonia loading of a vanadia doped tungsten-titania SCR catalyst**	**Dieter Rauch[C], Gaby Albrecht[1], David Kubinski[2], Ralf Moos[1]**	Nitrogen oxides are major emissions of lean burn combustion engines. For emission control, selective catalytic reduction exhaust gas aftertreatment systems are applied. Ammonia serves as the reducing agent and vanadia doped tungsten-titania is widely used as the catalyst material. Before the reduction of NOx can proceed, ammonia has to be adsorbed on the catalyst. Thereby, the conductivity of the catalyst material increases, which can be detected by microwaves excited in the catalyst housing. Using the technique presented in this work allows for determining the ammonia loading directly and in-situ.	1 Bayreuth Engine Research Center, Dept. of Functional Materials, University of Bayreuth, 95440 Bayreuth, Germany, Functional.Materials@Uni-Bayreuth.de 2 Ford Research and Advanced Engineering, 2101 Village Rd., Dearborn, MI 48124, USA	Germany , USA
MPS-T2-8	**# 2 Technologies for Chemical and Biochemical Sensing**	**Elaboration of soft and flexible silicone stencils for the wafer-level micropatterning of polymers**	**Benoit Darrieutort*, Claude Pellet*, Guillaume Pibre** and Cédric Ayela***	The micropatterning of polymers is of particular interest for the functionalization of chemical sensors by chemically sensitive coatings or the protection of locally defined areas (protective coatings). Despite the success of photolithography, alternative methods must be proposed to cover the full range of polymers available for chemical sensing, especially thermosentitive polymers. We report here an original shadow-masking process allowing the simultaneous deposition and patterning of polymers. Shadow-masking has already shown strong interest for the patterning of inorganic materials, with a focus on metals. However, the stencils are mainly manufactured by micro and nanomachining techniques from the silicon industry, resulting in high-cost, rigid stencils. In present work, simple printing methods are proposed for the wafer-level fabrication of flexible stencils by the use of silicone-based inks.	*Univ. de Bordeaux, CNRS UMR5218, IMS, ENSCBP, 16 Av. Pey-Berland 33607 Pessac, FRANCE ** Bluestar Silicones, 55 Rue des frères Perret 69192 Saint-Fons, FRANCE	France

MPS-T2-9	**# 2 Technologies for Chemical and Biochemical Sensing**	**Design and technology of biosensors based miniaturised platform for pesticide detection in vegetables**	**Carmen Moldovan[1*], Daniel Necula[1], Costin Brasoveanu[1], Radu Cornel[1], Bogdan Firtat[1], Marian Ion[1], Ion Stan[2]**	The paper work has been focused on the design and technology development of a miniaturized platform for pesticides detection. The miniaturized platform is containing a biosensor chip, a special vessel with 12 wells holding all fluids for biosensor activation and inhibition, the electrical connection to electronic modules for signal processing and data acquisition. The overall pesticides detection platform is connected into a portable apparatus of small dimensions, low energy consumption, easy to be manipulated, providing independent functioning of biosensor with data acquisition. The microcontroller will memorise the data and it is able to discard them on the PC via USB. The biosensor is based on miniaturized electrodes for amperometric measurement. Four miniaturized electrodes are places on a silicon sensor chip: two gold working electrode, one gold counter electrode and one silver reference electrode. The two working electrodes we be used independently one from the other and their role is to perform comparative measurements. The microfabrication technology is used to manufacture the sensor involving sputtering thin film deposition of TiUAu and TiIAg. Acetylcholinesterase is used as bioactive layer considering its sensitivity at organophosphoric compounds, carbamates and heavy metals. The acetylcholinesterase based sensor is designed to detect the toxic compounds from vegetables by measuring the current in solution between the working and counter electrode. All pesticides detection measurements are realized under the strict control of temperature and pH. The total response time of the amperometric sensor, considering the incubation time plus and the overall measuring steps is about 30 minutes.	1.IMT-Bucharest, 126A Erou Iancu Nicolae, 077190 Bucharest, Romania, 2.Romelgen SRL, 11 Ion Berindei, sector 2, Bucharest, Romania	Romania
MPS-T2-10	**# 2 Technologies for Chemical and Biochemical Sensing**	**All Screen Printed Circular Electrodes as Electrochemical Sensors**	**A.S.G. Reddy, B. B. Narakathu, S. Emamian, A. Eshkeiti, B. J. Bazuin, M. Joyce, M. Z. Atashbar**	A novel flexible electrochemical sensor was successfully screen printed on a polyethylene terephthalate (PET) film. Silver (Ag) ink was used for the metallization of the counter and working electrodes whereas carbon ink was deposited for the circular working electrode. The capability of the fabricated sensor for detecting trace concentrations of toxic chemicals was demonstrated. The cyclic voltammetry (CV) response of the printed sensor revealed a very high sensitivity at pico molar (pM) concentration levels of mercury sulfide (HgS). A percentage change in current of 30 % was observed for 1 pM concentration of HgS when compared with deionized (DI) water. The response of the electrochemical sensor is analyzed and presented in this paper	Western Michigan University, 4601 Campus Drive, Kalamazoo, Michigan-49008, USA	USA
MPS-T3-6	**# 3 Mechanisms, Modeling and Simulation**	**Intra-grain oxygen diffusion influence on conductivity of polycrystalline semiconducting compounds.**	**C. Malagù[1,2], A. Giberti[1,2], M. A. Ponce [4] and C. M. Aldao [4]**	The distribution of oxygen vacancies in metal oxide nanograins was modeled, considering the possibility of oxygen in- and out-diffusion, in a field-assisted and thermionic emission conduction model. Implications in electrical responses of SnO2 to oxygen concentration and temperature variations will be discussed and compared to an oxygen-free tin semiconducting compound.	1 Department of Physics and Earth Science, University of Ferrara, Via Saragat 1/c, 44122 Ferrara, Italy 2 MIST E-R s.c.r.l., Via P. Gobetti 101, 40129 Bologna, Italy 3IDASC - Istituto di Acustica e Sensoristica "O. M. Corbino," Italy, 4 Institute of Materials Science and Technology (INTEMA) University of Mar del Plata and National Research Council (CONICET) Juan B. Justo 4302, B7608FDQ Mar del Plata, Argentina.	Italy , Argentina
MPS-T3-2	**# 3 Mechanisms, Modeling and Simulation**	**Simultaneous determination of denisty, elastic and shear moduli of thin film utilizing vibrating AFM cantilever**	**I. Stachiv[1,2] and Yeau-Ren Jeng[1]**	Plenty of the chemical and biological sensors compose of a micro-/nanostructure with patterned thin film. Therefore their performance depends strongly on the film density and elastic moduli. Here we show that the AFM cantilever based mass sensors are capable to simultaneously determine both: the density and the elastic moduli of patterned thin film from the measured resonant frequencies of the cantilever with and without attached mass. Introduction	1Advanced Institute of Manufacturing with High-tech Innovations (AIM-HI), National Chung Cheng University, 168 University Road, Ming-Hsiung Township, Chia-Yi 621, Taiwan, ROC 2Institute of Physics, Czech Academy of Sciences, Na Slovance 2, Prague – 8, 182 21, Czech Rep.	Taiwan , Czech Republic
MPS-T3-5	**# 3 Mechanisms, Modeling and Simulation**	**Copper Oxide Based H_2S Dosimeters – Modeling of Percolation and Diffusion Processes**	**Jörg Hennemann[1], Claus-Dieter Kohl[1], Daniel Reppin[2], Bruno K. Meyer[2], Stefanie Russ[3], Thorsten Wagner[4]**	We propose a model for the conductance behavior of copper oxide gas sensors under exposure to hydrogen sulfide (H2S) at temperatures below 200°C. Under these conditions copper oxide shows a dosimeter type behavior. The H2S reacts with semiconducting copper oxide films and leads to the formation of metallic conducting copper sulfide islands. At a critical dose the conductance of the film increases steeply over several orders of magnitude. This increase can be interpreted by means of percolation theory. However, there are some deviations from the theoretical predicted slope values which are assigned to different copper oxide stoichiometries and sulfur diffusion into the bulk. The model is supported by gas measurements, time of flight secondary ion mass spectrometry and data analysis.	1 Institute of Applied Physics, Justus Liebig University Giessen, D-35392 Giessen, Germany 2 1st Physics Institute, Justus Liebig University Giessen, D-35392 Giessen, Germany 3 Institute of Theoretical Physics, Freie Universität Berlin, D-14195 Berlin, Germany 4 Faculty of Science, Department of Chemistry, University of Paderborn, D-33098 Paderborn, Germany	Germany
MPS-T3-1	**# 3 Mechanisms, Modeling and Simulation**	**Manufacturing and operational considerations for a polymeric-based SPR biochip**	**Leiva C. Oliveira[1], C.S. Moreira[1,2], A.G.B. Neto[1,3], A.M.N. Lima[1] and H. Neff[1]**	A polymer-based Surface Plasmon Resonance (SPR) biochip has been manufactured for allowing the operation at both the angular (AIM) and wavelength (WIM) interrogation modes. Simulationshave revealed the effects of the variations in the substrate (prism) construction parameters, like geometric dimensions and the layer materials. Also, investigations have been shown the effects of the operating point of SPR biochip for AIM and WIM over some figures of merit.	1-Dept. of Electrical Engineering, Universidade Federal de Campina Grande (UFCG), Rua Aprígio Veloso, 882 – Bairro Universitário, 58429-900 Campina Grande-PB, Brazil 1-Dept. of Electrical Engineering, IFAL, Maceio-AL, Brazil 3-Dept. of Electronic, IFPB, Cajazeiras-PB, Brazil	Brazil
MPS-T3-3	**# 3 Mechanisms, Modeling and Simulation**	**Microfluidics and solid-phase microextraction effects in Surface Enhanced Raman Scattering chips for rapid and sensitive malathion detection in water**	**Yan Deng [a], Qiuming Yu [b]**	Microfluidics and Solid-phase microextraction (SPME) effects were studied to reveal the rapid and sensitive detecting mechanism of Surface Enhanced Raman Scattering (SERS) microfluidic chips with polydimethylsiloxane (PDMS)-gold plasmonic nanostructure arrays for malathion detection in water. Coupled Microfluidics and SPME effects including Laminar flow, diffusion-convection, and mass adsorption phenomena were modeled and simulated using Comsol Multiphysics software. The simulation results show that microfluidics effect reduces the diffusion-convection balance time rapidly which thus improves the detecting effective, and that SPME effect increases the analyte concentration on the SERS hot spot dramatically which thus improves the detecting sensitivity. Low concentration pesticide malathion in water (1 ppb - 10 ppb) was detected to verify the performance enhancement.	a Department of Precision Instruments, Tsinghua University, Beijing 100084, P.R. China b Department of Chemical Engineering, University of Washington, Seattle, WA 98195, USA	P.R China , USA
MPS-T3-4	**# 3 Mechanisms, Modeling and Simulation**	**SiC-FET as SO_2 Sensors - Detection Mechanism Studies**	**Z. Darmastuti[1], N. Lindqvist[2], L. Ojamäe[1], M. Andersson[1], A. Lloyd Spetz[1]**	This work focuses on the mechanism of the SO2 detection for the SiC-FET (silicon carbide-field effect transistor) gas sensors. Mass spectroscopy was performed, on the porous Pt-gate sensors, to compare the quantity of SO2 and SO3 at the upstream and downstream of the sensor. The results show formation of a small amount of SO3 and indication of SO4 formation on the surface of the sensor. Additionally, quantum chemical calculations are employed to study the most probable path for the surface reactions.	1 Department of Physics, Chemistry, and Biology (IFM), Linköping University, Sweden 2 R&D Executions, Alstom Power AB, Växjö, Sweden	Sweden
MPS-T4-1	**# 4 Emerging Sensing Materials and Technologies**	**Advantages of using clusters formation and UVC exposition for obtaining new sensing material**	**A. R. Leite[1,2], L. F. Hernandez[1], E. R. Fachini[3], R. R. Lima[1,2], M. L. P. Silva[1]**	This work describes the production and tests of multi detection point QCM (quartz crystal microbalance) equipment useful on VOCs and water detection and a microstructures array for microTAS development. In order to ensure good performance on the equipment, adsorbent plasma deposited thin films were obtained and modified by the use of ultraviolet (UVC) radiation and/or ion bombardment (2.2 MeV, He+ or 20 KeV, Ar+) aiming to improve detection limit. Nanostructured organosilicon thin films and/or composites with starch particles showed good detection of such compounds if UVC radiation is used. Moreover, simultaneous analysis of the obtained measurements work as a fingerprint of more complex systems, such as hygroscopic polymer. On microstructured array, small dose of adsorbed solution can be observed.	1Polytechnic School, University of São Paulo, São Paulo, SP, Brazil 2Institute of Physics, University of São Paulo, São Paulo, SP, Brazil 3College of General Studies, University of Puerto Rico, Río Piedras, Puerto Rico, USA	Brazil , USA
MPS-T4-10	**# 4 Emerging Sensing Materials and Technologies**	**Centimeter-Sized Hierarchically Porous Metal Oxide Monoliths as Resistive Gas Sensors**	**Dominik Klaus,[1] Christian Weinberger,[1] Danielle Klawinski,[1] Jan-Henrik Smått,[2] Michael Tiemann,[1] Thorsten Wagner[3]**	We present resistive gas sensing measurements utilizing centimeter-sized hierarchically porous tin dioxide (SnO2) monoliths as transducers. Because of the macroscopic dimensions space-resolved conductivity measurements allow time-resolved monitoring of the gas propagation inside the monolith. Hence these monoliths can serve as model systems for diffusion studies of gaseous species in the pore system of gas-sensing layers. Besides porous metal oxide monoliths (ca. 25 nm average pore width) composite materials (silica/metal oxide) were also studied. Data of response to methane and carbon monoxide will be compared to numerical simulations (based on Knudsen diffusion) for both systems.	1 Faculty of Science, Department of Chemistry, Warburger Str. 100, D-33098 Paderborn, Germany 2 Laboratory of Physical Chemistry, Åbo Akademi University, Porthansgatan 3-5, FIN-20500 Åbo, Finland	Germany, Finland
MPS-T4-11	**# 4 Emerging Sensing Materials and Technologies**	**Characterization of individual CuO nanowires for conductometric gas sensing**	**F.Shao[1], F.Hernández-Ramírez[1,2*], J.D. Prades[3], N. López[2], C.Fábrega[1], T. Andreu[1], J.R.Morante[1,2]**	CuO nanowires (NWs) were successfully obtained by the thermal oxidation of Cu foils. Their electrical properties were evaluated at individual level and they were integrated in conductometric gas sensing devices. This p-type metal oxide exhibited a higher sensitivity to ammonia (NH3) than the previously reported for n-type SnO2 NWs, while the accurate analysis of the response to oxidizing and reducing gases revealed that oxygen species at the surface play a key role in their sensing mechanisms.	1 Catalonia Institute for Energy Research (IREC), E-08930 Sant Adrià del Besòs, Spain 2 Department of Electronics, University of Barcelona, E-08028 Barcelona, Spain 3 Institute of Chemical Research of Catalonia, ICIQ, Av. Països Catalans 16, 43007 Tarragona, Spain	Spain
MPS-T4-12	**# 4 Emerging Sensing Materials and Technologies**	**Colorimetric CO sensor for fire gas detection**	**Daniel Knop[1)], Carolin Peter[2)], Jürgen Wöllenstein[1),2)]**	A technique to detect CO, based on the color change of a binuclear rhodium complex is presented. Gasochromic sensors have been developed, which offer various advantages, such as fast response time and the use of simple instrumentation. These sensors can be integrated into fire detectors, being selective, reliable and energy-saving. Therefore, a low-power, low-cost and fully reversible sensor system has been investigated capable of detecting CO at low concentrations in air. The system exhibits a detection limit in the lower ppm range and a remarkable selectivity towards CO.	1) Fraunhofer Institute for Physical Measurement Techniques IPM, Heidenhofstrasse 8, 79110 Freiburg, Germany 2) University of Freiburg, Georges Köhler Allee 102, 79110 Freiburg, Germany	Germany
MPS-T4-13	**# 4 Emerging Sensing Materials and Technologies**	**Complex Metal Oxides for Gas Sensing Applications**	**Thanasak Sathiwitayakul[1], Ivan P. Parkin[1], Maxim Kuznetsov[2], Russell Binions[2]***	There is a need for new materials for chemiresistive gas sensors. Current materials suffer from significant cross sensitivity issues [1]. Complex metal oxides such as stagnates, tungstates and ferrites have not been extensively explored. It has been speculated that materials such as these complex metal oxide materials may have tunable and enhanced gas responses due to an ability to modulate the polarity of the material surface [2]. In this work we investigate the gas sensing properties of a number of complex metal oxide materials and find selectivity towards ethanol or carbon dioxide gas.	1 Materials Chemistry Research Center, Department of Chemistry, University College London, 20 Gordon Street, London WC1H 0AJ, United Kingdom 2 Institute of Structural Macrokinetics and Materials Science Russian Academy of Sciences (ISMAN), p/o Chernogolovka, Moscow region 142432 Russia. 3 School of Engineering and Materials Sciences, Queen Mary, University of London, Mile End Road, London E1 4NS, United Kingdom	United Kingdom , Russia
MPS-T4-14	**# 4 Emerging Sensing Materials and Technologies**	**Enhancement of the Ammonia Response of Nanowire Sensors Working in Temperature-Pulsed Mode**	**F.Shao[1], J.D. Fan[1], F.Hernández-Ramírez[1,2*], J.D. Prades[3], C.Fábrega[1], T. Andreu[1], A. Cabot[1], J.R.Morante[1,2]**	In this work, the response to ammonia (NH3) of ZnO nanowires deposited onto microhotplates (μHP) by dielectrophoresis (DEP) was evaluated using temperature-pulsed operation mode, taking isothermal mode as a reference. This working methodology becomes a good strategy to improve the performance of metal oxide sensors based on nanowires. Here, we qualitatively described the ammonia sensing mechanism in ZnO nanowires operated in pulsed mode, and the differences with isothermal measurements are discussed.	1 Catalonia Institute for Energy Research (IREC), E-08930 Sant Adrià del Besòs, Spain 2 Department of Electronics, University of Barcelona, E-08028 Barcelona, Spain	Spain
MPS-T4-15	**# 4 Emerging Sensing Materials and Technologies**	**Enhancing H_2S sensitivity and selectivity with CuO decorated SnO_2 nanowires**	**F. Shao[a,c], M.W.G. Hoffmann[a,c], J.D. Prades[b], R. Zamani[a,c], J. Arbiol[c,d], J.R. Morante[a,b], E. Varechkinae, M. Rumyantsevae, A. Gaskove, I. Giebelhausf, T. Fischerf, S. Mathurf, F. Hernández-Ramireza,b,***	In this work, p-CuO (particle)/n-SnO2 (nanowire) heterostructures were evaluated as selective H2S sensors, and the working principle behind their good performance was qualitatively modeled. It was concluded that the main sensing mechanism is dissimilar to standard redox reactions typical of regular metal oxide (MOX) devices, and it can be ascribable to the sulfurization of CuO and the consequent variation of the p-n junction structure at the CuO-SnO2 interfaces. Experimental data showed that these individual nanowire H2S sensors suit well for alarm applications with extremely high selectivity and sensitivity to this gas for concentrations between 1 ppm and 10 ppm.	a. Catalonia Institute for Energy Research (IREC), Barcelona, Spain b. Department of Electronics, University of Barcelona, Barcelona, Spain c. Institut de Ciència de Materials de Barcelona, ICMAB-CSIC, Campus de la UAB, Bellaterra, Spain d. Institució Catalana de Recerca i Estudis Avançats (ICREA), Barcelona, Spain e. Chemistry Department, Moscow State University, Moscow, Russia f. Institute of Inorganic Chemistry, University of Cologne,Cologne, Germany	Spain, Russia, Germany
MPS-T4-16	**# 4 Emerging Sensing Materials and Technologies**	**Environmental Sensing Semiconducting Nanoceramics made using a Novel Continuous Hydrothermal Synthesis Pilot Plant.**	**Anupriya J.T. Naik[1], Robert Gruar[1], Chris Tighe[1], Ivan P. Parkin[1], Jawwad Darr[1] and Russell Binions[2].**	A novel pilot-scale Continuous Hydrothermal Flow Synthesis (CHFS) reactor, capable of Kg/h synthesis of nanoparticles was used for the synthesis of nanostructured crystalline Zinc Oxide (ZnO) and Indium Oxide (In2O3), respectively. Transmission Electron Microscopy (TEM) evidenced an array of morphologies such as rods, spheres and hexagons (ZnO) and round-edged cubes (In2O3). The materials were also characterized by powder X-ray Diffraction and Raman spectroscopy. Metal Oxide Semiconductor (MOS) sensors based on the fabricated materials were prepared by screen-printing and evaluated against sub -ppb and -ppm concentrations of hazardous oxidizing and reducing gases e.g. NO2 and ethanol, at operating temperatures between 250 – 500 °C. We demonstrate the effective use of a new and scalable technology for the production of nanoceramics and the use of these materials for MOS sensing, for potential applications relevant to medical diagnostics, security detection and environmental monitoring.	1 University College London, Department of Chemistry, Christopher Ingold Laboratories, London, United Kingdom. 2 Queen Mary University of London, School of Engineering and Materials Science, London, United Kingdom.	United Kingdom
MPS-T4-2	**# 4 Emerging Sensing Materials and Technologies**	**Nanofibers Selective Membranes Used on Microreactors for Sample Pretreatment**	**A. N. R. Silva and M. L. P. Silva**	This work proposes a simple method to produce a set selective membranes inserted in miniaturized structures. Such approach is useful on microTAS and sensor development. These membranes are nanofibers composites produced by electrospinning process, using PAN as the polymer fiber, starch or carbon black as particles and copper phthalocyanine as sensor agent. Fiber characterization showed particles inserted inside the fibers and the ability for water adsorption on starch fibers or VOCs on carbon black ones. Such membranes deposited sequentially can act as a separation/removal steps for VOCs mixtures whereas phthalocyanine fibers deposited on QCM equipment function as detection system.	Department of Electronic System, Polytechnic School, University of Sao Paulo, Sao Paulo, Brazil Department of Electronic System, Faculty of Technology of Sao Paulo – FATEC-SP, Sao Paulo, Brazil	Brazil

MPS-T4-3	# 4 Emerging Sensing Materials and Technologies	**Porosity characterization of ZnO and ZnO:Al thin films**	**Bojorge, Claudia Daniela[1]; Heredia, Eduardo Armando[1] ; Casanova, Jorge Ramón[1]; Kellermann, Guinther[2] ; Cánepa, Horacio Ricardo[1] ; Craievich, Aldo Félix[3] ; Marotti, Ricardo Enrique[4]**	The sensitivity and response time of ZnO based sensors strongly depend on the porosity of the material: these pores are considered to play a vital role in the process of gas adsorption as the response of such sensors is based on chemisorptions. In the present work, pure and Al-doped ZnO thin films are synthesized by using sol-gel method and depositing by spin-coating technique upon silica substrates. Samples were characterized by XR a GISAXS using synchrotron radiation. GISAXS diagrams were analyzed using IsGISAXS software, determining the size and shape of the pores. Porosity values determined from the average density by XR and GISAXS techniques and were compared with those obtained by transmittance measurements.	1. DEINSO (Solid State Research Department) 2.Departamento de Física 3.Instituto de Física, Departamento de Física Aplicada. 4.Instituto de Física, Facultad de Ingeniería	Argentina
MPS-T4-4	# 4 Emerging Sensing Materials and Technologies	**Characterization of ZnO nanowires obtained by a two stage method**	**Cuellar Murillo G. A., Bianchetti M. F., Heredia E. A., Bojorge C. D. and Walsöe de Reca N. E.**	ZnO nanowires (or nanorods) have been widely studied due to their unique material properties and remarkable performance in electronics, optics, and photonics. Alone or forming composite compounds or structures with other components, is a suitable material for use in ultraviolet (UV) lasers and detectors operating in the wavelength range of 320 to 400 nm. The interest in ZnO structures synthesis has increased drastically in recent years due to their applications in nano-scale devices. ZnO has the widest variety of possible morphologies for a material, and their optical and electrical properties depend sensitively on the morphology and size. ZnO nanowires have great potential as UV radiation sensors, due to their high average current on / off, the fast response and recovery, transparent to visible light and low manufacturing cost. This makes them useful for application in flexible electronics as an optical gating. In this paper we present the results of the study of the UV gating properties of ZnO nanowires, grown on crystalline silicon and silica glass substrates, obtained by sol-gel method in two stages starting from a solution of isopropanol and zinc acetate dihydrate.	DEINSO (Solid State Research Department), CITEDEF UNIDEF (MINDEF – CONICET) Juan Bautista de La Salle 4397, (B1603ALO), Villa Martelli, Buenos Aires, Argentina	Argentina
MPS-T4-5	# 4 Emerging Sensing Materials and Technologies	**THE ROLE OF MORPHOLOGY IN P-TYPE SEMICONDUCTING METAL OXIDES (MOX)**	**A. A. Felix,[1,2] D. P. Volanti,[1] M. O. Orlandi,[1] G. Whitfield,[2] D.-J. Yang,[2] H. L. Tuller,[2] J. A. Varela,[1]**	CuO nanostructures were produced by microwave-assisted hydrothermal (MAH) method and the growth of different morphologies was controlled by the use of different bases and solvents. All samples were identified as CuO tenorite phase and showed three different morphologies: urchin-like, fiber-like and nanorods. CuO nanostructured gas sensor test devices were prepared and their gas sensing performance was simultaneously analyzed upon exposure to different gases at different operating temperatures and concentrations. The results show that morphology plays an important role in the gas-sensing performance of CuO samples.	1Departamento de Físico-Química, Instituto de Química, Universidade Estadual Paulista (UNESP) Araraquara, SP, 14800-900, Brazil 2Department of Materials Science and Engineering, Massachusetts Institute of Technology (MIT), Cambridge, MA, 02139, USA	Brazil , USA
MPS-T4-6	# 4 Emerging Sensing Materials and Technologies	**Low-Temperature Preparation and Electrical Properties of La-Doped BaTiO3 Ceramics with Fine Grains for PTC Thermistors**	**Qiuyun Fu, Hao Zu, Dongxiang Zhou, Yunxiang Hu, Shuping Gong, Zhiping Zheng, Wei Luo, Jun Zhao**	(Ba0.9965La0.0035)1.005TiO3 ceramics with low sintering temperature and fine grains for positive temperature coefficient (PTC) thermistors were prepared by reduction/reoxidation process in combination with sol-gel synthesis route. The (Ba0.9965La0.0035)1.005TiO3 powder was synthesized by the sol-gel route. Miniaturized ceramics were fabricated using the synthesized powder via the tape casting technique and reduction/reoxidation process. It is found that the sintering temperature of ceramics can be lowered to 1140 °C without degrading its electrical properties. Samples sintered at 1140 °C for 2 h in a reducing atmosphere and then reoxidized at 700 °C exhibited excellent electrical properties with a low room temperature resistivity of 327.2 Ω•cm and a resistance jump greater by 3.18 orders of magnitude.	School of Optical and Electronic Information, Huazhong University of Science and Technology, Wuhan 430074, China	China
MPS-T4-7	# 4 Emerging Sensing Materials and Technologies	**THz Spectroscopy of Semiconducting Oxides as Solid State Chemical Sensors**	**T. Arakawa, K.Tajima, T.Iinomi**	Summary Some physicochemical properties of semiconducting oxides as solid state chemical sensors were studies by the use of terahertz spectroscopy. The values of reflectance a 0.6 THz increased with the decrease of resistivity after the treatment of hydrogen atmosphere. Also, the sequence of the reflectivity of LnMnO3 is consistent with that of the activity of the methanol sensing.	Faculty of Humanity-Oriented Science and Engineering, Kinki University, Iizuka, Fukuoka, 820-8555, Japan	Japan
MPS-T4-8	# 4 Emerging Sensing Materials and Technologies	**Enhanced H2S gas sensing performance of PbS colloidal quantum dot solids**	**Huan Liu, Min Li, Dongxiang Zhou, Wei Luo, Gang Shao, Qiuyun Fu, Yunxiang Hu, Shuping Gong***	Colloidal quantum dots (CQDs) have versatile physical and chemical properties due to the large degrees of freedom in CQD materials processing, such as impurity doping and ligand exchange. We previously demonstrated CQD based gas sensors capable of detecting NO2 and H2S. Here we employed surface treatment engineering though ligand exchange to enhance the sensor performance for H2S gas detection. We varied the anions and cations of the ligands under the same treating conditions and found that Pb(NO3)2 treatment yielded highest response of 4218 with most rapid response/recovery time toward 50 ppm of H2S at 135oC. We proposed that the Pb(NO3)2-treated PbS CQD solids may have a moderate binding energy for H2S adsorption yet capable of leading to remarkable charge transfer.	School of Optical and Electronic Information, Huazhong University of Science and Technology, 1037 Luoyu Road, Wuhan, Hubei 430074, China.	China
MPS-T4-9	# 4 Emerging Sensing Materials and Technologies	**Influences of sintering atmosphere on the electrical properties and microstructure of Ba0.9965La0.0035TiO3 ceramics for PTC thermistors**	**Jun Zhao, Yinghua Zhang, Dongxiang Zhou, Qiuyun Fu, Shuping Gong, Yunxiang Hu, Zhiping Zheng, Wei Luo**	We investigated the effects of the sintering atmosphere on the electrical properties and microstructure of Ba0.9965La0.0035TiO3 (BLT) ceramics for positive temperature coefficient (PTC) thermistors. BLT ceramics were sintered in different atmospheres at 1150-1350 °C for 2 h and then reoxidized in air at 800 °C for 1 h. The results indicated that the sintering atmosphere affected the electrical properties and the microstructure of the BLT samples. The semiconducting BLT ceramics showed a pronounced PTC resistivity effect, with a resistivity jump greater than orders of 3 magnitude, along with a low room-temperature resistivity of 412 Ω•cm at a 97% N2-3% H2 sintering atmosphere.	School of Optical and Electronic Information, Huazhong University of Science and Technology, Wuhan 430074, China	China
MPS-T4-17	# 4 Emerging Sensing Materials and Technologies	**Functionalized Mesoporous Silica Nanoparticles (MSNs) for Micro-gravimetric Sensing to Ultra-low Concentration Ammonia**	**Pencheng Xu, Haitao Yu, Wei Zhao, Xinxin Li**	Mesoporous silica nanoparticles (MSNs), with –COOH sensing-groups inner-wall built at the same time of the MSNs formation (i.e. "one-pot" synthesizing), are developed as adsorbing induced micro-gravimetric sensing nano-material for detection of ultra-low concentration ammonia. Compared with conventional adsorbing/sensing materials [1], the advantages of our –COOH functionalized MSNs lie in ultra-high specific surface area (about 1000m2/g), dense immobilization of high-specific -COOH groups and short length of meso-channels (shorter than 100nm) for quick adsorption/detection. Using our lab-made resonant micro-cantilever (with mass sensitivity as 1.53Hz/pg [2]) as sensing platform, the new-type sensing nano-material of the functionalized MSNs has been experimentally validated, resulting in resolubale detection to ultra-low concentration NH3 gas of 50 parts per billion (ppb).	State Key Lab of Transducer Technology, Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, Shanghai 200050, CHINA.	China
MPS-T4-18	# 4 Emerging Sensing Materials and Technologies	**All Printed Pentacene Organic Thin Film Transistors for Humidity Sensing**	**A.S.G. Reddy, B. B. Narakathu, S. Emamian, A. Eshkeiti, B. J. Bazuin, M. Joyce, M. Z. Atashbar**	Organic thin film transistors (OTFT) with width to length (w/l) ratio of 26 have been successfully printed on flexible polyethylene terephthalate (PET) substrate using a combination of gravure, screen and ink-jet printing methods. Gravure printing was used to deposit the bottom gate electrode and dielectric layers using a silver (Ag) and UV clear ink, respectively. Screen printing was employed for printing the source and drain electrodes using Ag ink. A humidity sensitive semiconductor, pentacene, was eposited as an active layer using inkjet printing. The output transfer characteristics of the all printed device were studied from 25% RH to 90% RH. A percentage change of 870 % at 90% RH, in the drain current (ID), was obtained when compared to the ID at 25% RH. The response of the all printed sensor was analyzed and is reported in this paper	Western Michigan University, 4601 Campus Drive, Kala mazoo, Michigan-49008, USA	USA
MPS-T5-1	# 5 Sensor Arrays and Data Analysis	**Study on the Factors Influencing the Recognition Error of Dynamic Calibrated E-nose When It is Applied in Static Environments**	**Jun Yu, Jiarui Wu, Hongzeng Liang, Zhenan Tang**	Dynamic calibration method is widely used in the calibration of gas sensors and training of E-nose. Large recognition errors may occur when the E-nose is applied in the static situations due to the environment differences between the calibration condition and the application condition. Influences of gas flow velocity, air pressure and humidity on the performance of gas sensors and E-nose were measured and solutions to vomize the influence of these factors on the recognition error of E-nose were discussed. Results show that the gas flow velocity should be controlled in a suitable range both in calibration and application of the E-nose, and humidity must be taken into concern in the training of the E-nose, and the influence of air pressure can be ignored.	School of Electronics Science and Technology, Dalian University of Technology, Dalian, China, 116024	China
MPS-T5-2	# 5 Sensor Arrays and Data Analysis	**Detection, discrimination, and classification of gases using an array of Love-wave sensors with a combination of nanoparticles of oxides and different metals as active centers**	**D. Matatagui[1], J.P. Santos[1], M.J. Fernández[1], J. Fontecha[1], I. Gràcia[2], C. Cané[2], M.C. Horrillo**	A novel array comprised of eight Love-wave sensors based on films of ZnO and TiO2 nanoparticles with different metals as active centers has been developed to detect, classify, and discriminate gases. These films work as guide and sensitive layer of every Love-wave sensor. The interaction with gases changes the electrical properties and the density of the different layers of nanoparticles, and consequently each sensor suffers a different frequency shift. So far, the array has been tested with different concentrations of toluene and ammonia. Very low concentrations of these samples have been detected and discriminated by principal component analysis, such as 5 ppm of toluene and 10 ppm of ammonia.	1. GRIDSEN, Instituto de Seguridad de la Información, CSIC, Serrano 144, 28006 Madrid, Spain. 2 Instituto de Microelectrónica de Barcelona, CSIC, Campus UAB, 08193 Bellaterra, Spain	Spain
MPS-T5-3	# 5 Sensor Arrays and Data Analysis	**Drift compensation of virtual multisensor systems based on extended calibration**	**Christian Bur, Markus Engel, Stephan Horras, and Andreas Schütze**	Virtual multisensor systems, e.g. based on temperature cycled operation (TCO), achieve high selectivity and have also proven more stable than conventional multisensor arrays. However, sensor drift still leads to changes in the sensor response patterns preventing correct interpretation without further effort. In this paper we show that extended calibration routines, most simply performed by repeating the same calibration measurements after a given time during which the sensor system already shows drift, can be used for sensor systems based on gas-sensitive field effect transistors (GasFETs) as well as metal-oxide semiconductors (MOS) sensors. The result shows a greatly improved stability of the system combining sensor with dynamic operation and multivariate data analysis for gas identification. The approach has been tested both under controlled laboratory conditions for identification of single gases as well as for more realistic scenarios with complex gas mixtures for applications in fire detection and odor assessment.	Lab for Measurement Technology, Dept. of Mechatronics, Saarland University, 66123 Saarbrücken, Germany	Germany
MPS-T5-4	# 5 Sensor Arrays and Data Analysis	**Multi-sample Classification of Chemo-Sensory Cues**	**Alexander Vergara,Kurt D. Benkstein, Steve Semancik**	Multiple samples drawn separately from the same source can have superior descriptive power, both in quality and in quantity, compared to a single sample characterization of the chemical source. Based on this observation, we empirically explore a multi-sample measurement technique and its benefit in odor identification. Utilizing a measurement set recorded from a metal-oxide microhotplate gas sensor, we show that, not only the mean of the sensor response, but also its higher order statistics can be odor-stimulus specific. Our results suggest that, when extracted properly in a multi-sample setting, high-order moments of the sensor response can substantially contribute to the recognition performance.	Biomolecular Measurement Division, National Institute of Standards and Technology, Gaithersburg, MD, USA	USA
MPS-T5-5	# 5 Sensor Arrays and Data Analysis	**Chemometric Resolution for hyphenated Gas Chromatography Ion Mobility Spectrometry**	**S. Marco[1,2], G. Singla-Buxarrais[1], S. Oller-Moreno[1,2], J.M. Jiménez-Soto1, A. Pardo2, R. Delgado-Garrido[3], L. Arce[3]**	The addition of a multi-capillar gas chromatography column to Ion Mobility Spectrometer was proposed in the past in order to increase chemical resolution. Short chromatography times lead typically to high levels of co-elution. Ion mobility spectra are key to resolve those co-eluted chemicals. From data processing point of view hyphenated techniques provide second order data that allows chemometric resolution techniques to be applied. For the first time chemometric resolution techniques are used to deconvolve co-elution in gas chromatography when having an Ion Mobility Spectrometer as detector. Positive results will be presented and the limits of the technique will be explained. The analysis will be applied to real data corresponding to olive oil headspace analysis.	1 Signal and Information Processing for Sensing Systems, Institute for Bioengineering of Catalonia, Baldiri I Rexach 4-8, 08028-Barcelona 2 Intelligent Signal Processing, Departament d'Electrònica, Universitat de Barcelona, Martí i Franquès 1, 08028-Barcelona. 3 Dept. of. Analytical Chemistry, Universidad de Córdoba, Campus Rabanales, 14071-Córdoba, Spain.	Spain
MPS-T6-2	# 6 Auxiliary Components, Manufacturing and Packaging	**Investigation of polymers as passivation materials for H_2O_2 gas sensors**	**Jan Oberländer[1,2], Patrick Kirchner[1], Markus Raue[1], Thomas Mang[3], Michael J. Schöning[1,2]**	In order to monitor commercial sterilization processes calorimetric H2O2 gas sensors have been developed previously, in form of a differential set-up of a catalytic active and a passive temperature-sensitive element (Fig. 1). The stability of these gas sensors depends mainly on the chemical inertness and thermal durability of the passivation materials. With respect to these requirements polymeric materials (perfluoralkoxy, fluorinated ethylene-propylene and SU-8 photoresist) have been investigated.	1 Institute of Nano- and Biotechnologies (INB), Aachen University of Applied Sciences, 52428 Jülich, Germany 2 Peter Grünberg Institute (PGI-8), Research Centre Jülich GmbH, 52425 Jülich, Germany 3 Institute of Applied Polymer Chemistry (IAP), Aachen University of Applied Sciences, 52428 Jülich, Germany	Germany
MPS-T6-1	# 6 Auxiliary Components, Manufacturing and Packaging	**A new bond pad surface preparation process for flip-chip assembly in chemical sensors ISFET applied to environmental monitoring systems**	**V. F. Cardoso[1], A. N. R. Silva[1,2], J. L. Cardoso[2], M. Pojar[1,4], Z. M. Rocha[1], M. O. Igarashi[1], A. C. Seabra[1]**	The control of water quality monitoring rivers, reservoirs and wellsprings is very important, and ISFET (Ion Seletive Field Effect Transistor) is the main electrochemical sensor for pH measurements in drinking water monitoring system. As the integration of ISFET in MicroTotal Analysis Systems (μ-TAS) with internal fluidic channels is very difficult, it is presented in this work the results of bond pad remetallization using an adapted E less Ni/Au process. This modified procedure enables the ISFET to be integrated by the flip-chip technique in μ-TAS. The results show that a gold surface finish on the bond pad has a good quality and attain enough thickness to	1Department of Electronic System, Polytechnic School, University of Sao Paulo, Sao Paulo, Brazil 2Department of Electronic System, Faculty of Technology of Sao Paulo – FATEC-SP, Sao Paulo, Brazil 3Institute for Technological Research, IPT, Sao Paulo, Brazil. 4Centro Universitario da FEI, S.B.Campo, Brazil	Brazil
MPS-T7-3	# 7 Sensing for Health, Safety and Security	**Ozone gas sensor based on ZnO nanorods film obtained via hydrothermal method**	**A. C. Catto[1] ,L. F. da Silva[2], C. A. Escanhoela Jr[1], S. Bernardini[3], K. Aguir[3], V. R. Mastelaro[1]**	In the last years, the ozone gas sensors have been the subject of great attention for monitoring and determination of ozone gas concentration due to its high toxicity and effects to human health. In this study, we investigated the ozone sensing properties of as-prepared ZnO nanorods-like structures grown directly onto a substrate containing electrodes via hydrothermal method. The sensor response was studied for ozone concentration ranging from 0.08 ppm to 1 ppm at different operating temperatures. The ZnO nanorods displayed a short response time of 25 s and a recovery time of 86 s when exposed to 1 ppm of ozone at 250°C. Our results indicate that ZnO nanorods show a good sensitivity to the presence of ozone, even when exposed to a low concentration (0.08 ppm).	1 Instituto de Física de São Carlos, Universidade de São Paulo, 13566-590, São Carlos, SP, Brazil 2 Instituto de Química, Universidade Estadual Paulista, 148000-900, Araraquara, SP, Brazil 3 CNRS, IM2NP (UMR 7334), Aix-Marseille Université, 13397, Marseille, France	Brazil ,France
MPS-T7-7	# 7 Sensing for Health, Safety and Security	**DEVICE FOR BREATH TEST HP-INFECTION BASED ON FIELD EFFECT GAS SENSOR**	**A.V. Litvinov[1], I. N. Nikolaev[1], N.N. Samotaev[1] and D.A. Nozdrya[2]**	Successful clinical tests device based on the Metal Insulator Semiconductor Field Effect (MIS-FE) gas sensor for diagnostics of Helicobacter pylori infection (HP-infection) are conducted by a method of the breath test. Method is based on detecting increase concentration of ammonia in exhaled air by the patient after reception water solution of Carbamide. Stability work the device is based on high sensitivity and stability of the especially developed MIS-FE gas sensor to Ammonia and system of gas sampling.	1National Research Nuclear University MEPHI, 115409, Kasirskoe highway 31, Moscow, Russian Federation 2Scientific and Production Company "INKRAM", 109341, Lublin Street, 151, office 222, Moscow, Russian Federation	Russian Federation

MPS-T7-6	**# 7 Sensing for Health, Safety and Security**	**Chemoresistive gas sensors for detection of colorectal cancer biomarkers.**	**B. Fabbri[1,2], S. Gherardi[1], A. Giberti[1,2], V. Guidi[1,2,3], C. Malagù[1,3], G. Zonta[1]**	Nanotechnology has considerable promise for the detection, staging and treatment of cancer. Medical studies show that tumor growth is accompanied by protein changes that may lead to the peroxidation of the cell membrane with consequent emission of volatile organic compounds (VOCs) by breath or intestinal gases that should be seen as biomarkers for colorectal cancer (CRC). The analysis of VOCs represents a non-invasive and potentially inexpensive medical diagnostics. An array of chemoresistive gas sensors based on screen-printed metal oxide semiconducting films has been selected to discriminate gases of oncological interest, as 1-iodononane and benzene compounds, from those of interference in the gut, as methane and nitric oxide.	1 University of Ferrara, Department of Physics and Earth Science, via Saragat 1/C, 44122 Ferrara, Italy 2 MIST E-R S.C.R.L., Via P. Gobetti 101, 40129 Bologna, Italy 3 IDASC - Istituto di Acustica e Sensoristica "O. M. Corbino,"	Italy
MPS-T7-9	**# 7 Sensing for Health, Safety and Security**	**Improving the visibility of low contrast structures in conventional CsI (Tl) mammography systems using image processing**	**D. Glotsos[1], N. Kalyvas[1], S. Kostopoulos[1], I. Kalatzis[1], P. Asvestas[1], L. Lavdas[2], D. Cavouras[1]**	In this study we present a structured sequence of image processing steps that aim in improvement of image quality on a standard CsI (Tl) phosphor detectors used in commercial Digital Mammography, in order to enable the visual detection of low contrast subtle abnormalities, and, thus, improve the accuracy of diagnostic conclusions.	†Department of Biomedical Engineering, Technological Educational Institute of Athens, 12210 Athens, Greece ‡Department of Medical Radiological Technology, Technological Educational Institute of Athens, 12210 Athens, Greece	Greece
MPS-T7-8	**# 7 Sensing for Health, Safety and Security**	**Early Detection of Fires in Electrical Installations by Thermally Modulated SnO_2/Additive-Multi Sensor Arrays**	**Jens Knoblauch[§], Navas Illyaskutty and Heinz Kohler***	In this work, a setup for generation and analysis of pyrolysis gases, which can operate multi gas sensor arrays of different SnO2/Additive admixtures, is introduced. The gas sensor arrays are thermo-cyclically operated and are investigated towards their characteristic features of the conductance-over-time profiles (CTPs) for identification and analysis of pyrolysis gases at low concentrations emitted for instance by overloaded electrical cables. Several SnO2/Additive gas sensitive layers have been examined and preliminary screening tests with pyrolysis gas related model gases like CO, methane and propene are already conducted.	Institute for Sensorics and Information Systems, Karlsruhe University of Applied Sciences, Moltkestr. 30, 76133, Karlsruhe, Germany.	Germany
MPS-T7-10	**# 7 Sensing for Health, Safety and Security**	**Airborne allergen determination for Der f1 by chemifluorescent immunoassay with bioaerosol sampler.**	**Kumiko Miyajima[1,2], Yurika Suzuki[1], Daisuke Miki[1], Moeka Arai[2], Takahiro Arakawa[2], Hiroji Shimomura[3] and Kohji Mitsubayashi[1,2]***	A fiber-optic chemifluorescent immunoassay system for detection of Der f1 was constructed. Der f1 is one of the most important indoor allergens derived from Dermatophagoides farinae. The system measures Der f1 as fluorescence amplified by an enzymatic reaction between labeled enzyme to a detection antibody and fluorescent substrate. The measurement range for Der f1 was 0.49 - 250 ng/ml which was equal to ELISA. The system had also high selectivity compared to other airborne allergens. Moreover, a bioaerosol sampler was constructed. The sampler was able to collect the airborne allergens directly to the test liquid. The airborne Der f1 was collected by the sampler and measured by the fiber-optic immunoassay system in the range of 0.125 - 2.0 mg/m3.	1 Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University, Tokyo, Japan 2 Institute of Biomaterials and Bioengineering, Tokyo Medical and Dental University, Tokyo, Japan 3 Faculty of Health Science Technology, Bunkyo Gakuin University, Tokyo, Japan	Japan
MPS-T7-1	**# 7 Sensing for Health, Safety and Security**	**Non newtonian viscosity in a single channel microviscometer**	**Nadim Morhell* and Hernán Pastoriza***	In this work, viscosity of power law non newtonian fluids is discussed and measurements methods are proposed. The rheometry is based on the dynamics of a capillary viscometer, where the velocity and position of a fluid drop entering a microchannel depends only on the channel dimensions, the capillary pressure and the fluid viscosity.	*Instituto Balseiro – Universidad Nacional de Cuyo *Consejo Nacional de Investigaciones Científicas y Técnicas - Comisión Nacional de Energía Atómica Centro Atómico Bariloche - Av. Bustillo 9500 – S.C. Bariloche – Río Negro - Argentina	Argentina
MPS-T7-5	**# 7 Sensing for Health, Safety and Security**	**Detection of explosives by rat olfaction using brain-machine interface**	**Qi Dong, Liang Hu, Liping Du, Ping Wang**	The detection of explosive materials is a highly significant task, which could help in reducing the continued fatalities. Mammalian olfactory systems have extraordinary ability to detect and discriminate odorants at very low concentrations. It is reported that some common explosives such as RDX and TNT could interact with and activate olfactory receptors [1]. In this study, we present a novel bioelectronic nose based on brain-machine interface using rat olfaction to detect explosives. We measured neural responses of M/T cells to different stimuli including some common explosives and irrelevant odorants in vivo and then assessed the smell by neural decoding methods. The results indicate that explosive stimuli can be recognized preliminarily, which suggests future actual applications in military and security fields.	Biosensor National Special Laboratory, Key Laboratory for Biomedical Engineering of Education Ministry, Department of Biomedical Engineering, Zhejiang University, Hangzhou, 310027, P. R. China.	P.R China
MPS-T7-4	**# 7 Sensing for Health, Safety and Security**	**Detection of Gaseous and Liquid Exhaled Breath Based on SAW Devices for Lung Cancer Diagnosis**	**Y. Zou[1,2], X. Zhang[1,2], C. An[1,2], D Wang[1,2], P. Wang[1,2,*] *presenter is Liujing Zhaung***	The aim of this paper is to introduce a detection system based onsurface acoustic wave (SAW)devices, which could synchronously detect gaseous exhaled breathand exhaled breathcondensate(EBC).Exhaled breath flowing into the system would be divided into gaseous and liquid breath.Volatile organic compounds (VOCs) in gaseous breath were detected with an uncoated Rayleigh waveSAW resonator, while carcinoembryonic antigen (CEA) in EBC was detected with aLove wave delay line SAW resonator which is modified with anti-CEA monoclonal antibody.For the results, lung cancer markers in exhaled breath can be detected accurately with the whole system.	†Biosensor National Special Lab, Key Lab for Biomedical Engineering of Ministry of Education, Department of Biomedical Engineering, Zhejiang University, 310027 Hangzhou, China. 2 State Key Laboratory of Transducer Technology, Shanghai, China	China
MPS-T8-8	**# 8 Sensors for High Temperature Processes and Harsh Environment Applications**	**Selective hydrogen sensing at elevated temperature using SiOC sensors**	**A. Karakuscu[1], A. Ponzoni[2], E. Comini[2], G. Faglia[1], D. Ayana[3], G.D. Soraru[3] and G. Sberveglieri[2].**	Porous SiOC is proposed as suitable material for gas sensing applications, exploiting its high surface area and chemical stability. The typical high electrical resistance of SiOC, which prevented till now its exploitation to develop conductometric devices, is solved through a proper control of its carbon content and thermal treatments. The developed gas sensors showed high sensitivity to H2 at elevated temperatures (>500°C). They give response to NO2 up to 400°C. At higher temperatures, they respond only to H2. We believe that this new kind of nanoporous ceramic gas sensors can give a new perspective for exploitation of ceramic materials in gas sensing field.	1. Department of Information Engineering, Sensor lab, CNR-IDASC and University of Brescia, Brescia, ITALY; 2. Department of Industrial Engineering, University of Trento, Trento, ITALY	Italy
MPS-T8-4	**# 8 Sensors for High Temperature Processes and Harsh Environment Applications**	**Influence of ionizing radiation on MISFET hydrogen sensors**	**B. Podlepetsky, A. Kovalenko**	The integrated hydrogen sensors with palladium-gate MISFET sensing element have been developed and investigated. The electron irradiation influence on hydrogen sensitivity of these sensors have been studied. The threshold voltage of MISFETs as a function of hydrogen concentration were determined before and after each irradiations. It is found that this functions are monotonically drifting to 0.7 V under radiation doses up to ~ 700 Gy and after following irradiations the hydrogen sensitivity are steadily decreasing. The maximum radiation drift of the initial threshold voltages (at zero hydrogen concentration) was equal 1.6 V under doses ~ 4000 Gy. The maximum radiation sensitivity ~ 0.2 mV/Gy. According to represented models the hydrogen sensitivity should be decreased to zero after irradiation by doses more then 15 kGy. The ionizing radiation doses less then 5 Gy are not dangerous for these sensors.	Department of micro- and nanoelectronics, National Research Nuclear University ~ Moscow Engineering Physics Institute, 31, Kashirskoe sh., 115409, Moscow, RUSSIA.	Russia
MPS-T8-1	**# 8 Sensors for High Temperature Processes and Harsh Environment Applications**	**Redox properties of nanostructured transition metal-doped ceria mixed oxides for gas sensor applications**	**C. Albornoz[1], F.Muñoz[2], R. Fuentes[1,4] and A.G. Leyva[1,3]**	In this work, structural properties and reduction-oxidation behavior of nanostructured transition metal-doped ceria (transition metal: Cu and Mn) solid solutions have been studied by synchrotron radiation techniques.	1 Departamento de Física de la Materia Condensada, Centro Atómico Constituyentes, CNEA, Av. Gral. Paz 1499, (1650) San Martín, Buenos Aires, Argentina. 2CINSO (Centro de Investigaciones en Sólidos), UNIDEF, J.B. de La Salle 4397, 1603 Villa Martelli, Buenos Aires, Argentina.3 Escuela de Ciencia y Tecnología, Universidad Nacional de San Martín, Av. Gral. Paz 1499, (1650) San Martín, Buenos Aires, Argentina. 4CONICET, Buenos Aires, Argentina.	Argentina
MPS-T8-2	**# 8 Sensors for High Temperature Processes and Harsh Environment Applications**	**Resistive switching effects in HfO2 based memory devices**	**C. Quinteros,[1,2,3] F. G. Marlasca,[1] P. Stoliar,[4,5] R. Zaspe,[4] F. Golmar,[2,*] L. Hueso[4,6] and P. Levy.[1,2]**	Metal/ insulator/ metal capacitor-like structures are prominent candidates for flash memory replacement technology, as the Resistive Switching mechanism appealing features (speed, downscaling, retention, endurance) evolve into a mature technology, coined Resistive Random Access Memory (ReRAM). In this work we report on the electrical characterization of HfO2-based structures, performed within different configurations and comparing before and after oxygen-ions' irradiation, for the implementation of non-volatile memory devices.	1. GIyA and INN, CNEA, Av.Gral Paz 1499, (1650), San Martín, Buenos Aires, Argentina. 2. Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Argentina. 3. Universidad de Buenos Aires, Ciudad Universitaria, Pabellón I (1428), Ciudad Autónoma de Buenos Aires, Argentina. 4. Escuela de Ciencia y Tecnología, UNSAM, Campus Miguelete, (1650), San Martín, Buenos Aires, Argentina. 5. IMN, Université de Nantes, CNRS, 2 rue de la Houssinière, BP 32229, 44322 Nantes, France. 6. CIC nanoGUNE, 20018 Donostia-San Sebastián, Basque Country, Spain	Argentina , France , Spain
MPS-T8-5	**# 8 Sensors for High Temperature Processes and Harsh Environment Applications**	**Impurity and aging effects in Pt/YSZ based systems**	**Corinna Vonau[a][b], Rainer Ginzel[a], Ulrich Guth[b]**	One main aim of improving properties of exhaust gas sensors is to lower their operation temperature to enable faster start-up times. To reach a comparable performance at lower temperatures, high ionic conductivity of the solid electrolyte and low charge transfer resistance have to be provided. The problem of increasing electrolyte resistance by decreasing temperature is further promoted by impurities. SiO2 is a well known impurity in platinum and stabilized zirconia (Pt/YSZ) based systems for applications in SOFC or lambda sensors, lowering the cell performance as well as the mechanical strength and aging stability of the electrodes. To show the influence of impurities different YSZ substrates with and without SiO2 were characterized before and after aging treatments. The results of electrochemical characterization, REM, and STEM images give an explanation for damaging mechanisms promoted by SiO2, acting as blocking glassy phase along YSZ grain boundaries. Depending on the treatment there are different types of degradations in discussion.	a) Robert Bosch GmbH, Wernerstraße 51, 70469 Stuttgart, Germany b) Technische Universität Dresden, Fachbereich für Physikalische Chemie und Elektrochemie, Bergstraße 66b, 01062 Dresden, Germany	Germany
MPS-T8-7	**# 8 Sensors for High Temperature Processes and Harsh Environment Applications**	**On the combination of Porous Silicon and Carbopack B for DNT traces preconcentration**	**F. James[1], P. Breuil[1], C. Pijolat[1], J-P Viricelle[1], M. Camara[2], D. Briand[2]**	The development and the characterization of a preconcentrator device to determine trace levels of one of the markers of the explosive trinitrotoluene (TNT: 2,4-dinitrotoluene (2-4DNT) with a photo-ionization detector have been made. This preconcentrator is a silicon microreactor which has a deep-reactive-ion-etched (DRIE) cavity, filled with an adsorbent and a heater to monitor adsorption-desorption cycles. Different adsorbents (Tenax@, Carbon powder, Carbopack@) and also the Porous Silicon (obtained by DRIE of the Si device) have been compared by TPD analyses and adsorption/desorption cycles. The best performances for DNT preconcentration are obtained with a combination of Carbopack@B (C-B) and Porous Silicon (PS)	1Ecole Nationale Supérieure des Mines, SPIN-EMSE, CNRS: UMR5307, LGF, F- 42023 Saint-Etienne, France 2Ecole Polytechnique Fédérale de Lausanne (EPFL), Institute of Microengineering (IMT), Sensors, Actuators and Microsystems Laboratory (SAMLAB), jaquet droz 1, 2000 Neuchâtel, Switzerland	France , Switzerland
MPS-T8-6	**# 8 Sensors for High Temperature Processes and Harsh Environment Applications**	**Inkjet Printed Copper(II)Oxide for Highly-Selective H2S Sensing Under Anaerobic Conditions**	**J. Kneer[a], M. Boxberg[b], S. Palzer[a], J. Wöllenstein[a,b]**	During biogas production highly corrosive hydrogen sulfide (H2S) inevitably occurs along with the desired methane in an oxygen depleted atmosphere. High humidity levels and other contaminants add to the harsh environment in-situ sensors are faced with. Robust, low-cost semiconducting metal oxide (MOX) sensors are a possible solution. However, oxygen concentrations of 1% and a lack of selectivity make current SnO2 or ZnO based sensors unsuitable. Here we report on a novel approach for highly selective H2S sensing using p-type copper(II)oxide, relying on the reactive impact of H2S converting CuO to conductive, sulfidic structures. We show that the effect is reversible, even at highly anaerobic conditions. The MOX particles are deposited using inkjet-technology which results in thin, porous layers promoting sensitivity.	a.Laboratory for Gas Sensors, Department of Microsystems Engineering, University of Freiburg, Georges-Köhler-Allee 102, 79110 Freiburg, Germany, bFraunhofer Institute for Physical Measurement Techniques, Heidenhofstraße 8, 79110 Freiburg, Germany	Germany
MPS-T10-2	**# 10 Hybrid Devices**	**Building Memristive and Radiation Hardness TiO2 based Junctions**	**N. Ghenzi[1], D. Rubi[1,2,3], E. Mangano[4], G. Gimenez[4], M. Barella[4], F. Golmar[4], J. Leli[1], A. Zelcer[1,2], P. Stoliar[1,3], and P. Levy[1,2]**	A variety of metal-oxide interfaces exhibit reversible and non-volatile changes between two stable electric resistance states after the application of pulsed electric stimulus (voltage or current). This electric pulse induced resistive switching (RS) effect is the most promising candidate for memory devices because it allows downscaling and exhibits high retentivity time, multilevel states and low power consumption [1]. Besides, this emerging technology, called resistive random-access memory (RRAM), exhibits fast switching speeds (< ns) and high endurance, characteristics that turn it into a good candidate to compete with existing flash memory devices. Here we report the fabrication and structural and electrical characterization of the junctions. We obtained a retentivity of 105 s, an endurance of 104 cycles and reliable switching with short electrical pulses (time-width below 10 ns). Additionally, the devices were exposed to 25 MeV oxygen ions. Then, we performed electrical measurements comparing pristine and irradiated devices in order to check the feasibility of using these junctions as memory elements with memristive and radiation hardness properties.	1. GIyA and INN, CNEA, Av. Gral. Paz 1499 (1650), San Martín, Buenos Aires, Argentina 2. Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Argentina. 3. Escuela de Ciencia y Tecnología, UNSAM, Campus Miguelete, (1650), San Martín, Buenos Aires, Argentina 4. CMNB, INTI, Av. Gral. Paz 5445 (1650), San Martín, Buenos Aires, Argentina.	Argentina
MPS-T10-1	**# 10 Hybrid Devices**	**Sensors for the monitoring of corrosion risks, corrosion reducing procedures and critical conditions of buildings, especially consisting of reinforced concrete**	**Winfried Vonau, Frank Berthold, Kristina Ahlborn, Frank Gerlach**	For various reasons buildings can be damaged by structural and architectural shortcomings or by long acting unfavourable external influences. Particularly, armoured concrete buildings are often exposed to this risk because the metallic reinforcing material can quickly corrode when its coating is not tight. Mainly, chloride-containing media (e.g. de-icing salt) can initiate the corrosion. Also buildings without steel reinforcement are often damaged, caused e.g. by insufficient insulation and permanent exposure to vertical and/or horizontal attacking moisture. This humidity input has a direct influence on the thermal insulation of buildings. In this contribution a modular corrosion measurement system for the intelligent monitoring of reinforced concrete structures is described. Additionally, a chloride measuring module for the monitoring of the electrochemical chloride extraction from armoured concrete and a system with stationary and mobile electrodes for the estimation of the moisture content in structures are introduced. These examples show the applicability of electrochemical sensor technology in the above mentioned problem area.	Kurt-Schwabe-Institut für Mess- und Sensortechnik e.V. Meinsberg, Kurt-Schwabe-Straße 4, 04736 Waldheim, Germany	Germany