



Electronic Noses & Sensors for the Detection of Explosives

Edited by

Julian W. Gardner and
Jehuda Yinon

NATO Science Series

Electronic Noses And Sensors For The Detection Of Explosives

**Justyna Płotka-Wasyłka, Jacek
Namieśnik**



Electronic Noses And Sensors For The Detection Of Explosives:

Electronic Noses & Sensors for the Detection of Explosives J. Gardner, Jehuda Yinon, 2004-08-17 This book examines both the potential application of electronic nose technology and the current state of development of chemical sensors for the detection of vapours from explosives such as those used in landmines The two fields have developed somewhat in parallel over the past decade and so one of the purposes of this workshop on which the book is based was to bring together scientists from the two fields in order to challenge the two communities and mutually stimulate both fields It begins with a review of the basic principles of an electronic nose and explores possible ways in which the detection limit of conventional electronic nose technology can be reduced to the level required for the trace levels observed for many explosive materials Next are reviews of the use of several different types of solid state chemical sensors polymer based sensors i e chemiluminescent fluorescent and optical to detect explosive materials metal oxide semiconducting resistive sensors and then electrochemical sensors Next different pattern recognition techniques are presented to enhance the performance of chemical sensors Then biological systems are considered as a possible blue print for chemical sensing The biology can be employed either to understand the way insects locate odorant sources or to understand the signal processing neural pathways Next is a discussion of some of the new types of electronic noses namely a fast GC column with a SAW detector and a micromechanical sensor Finally the important issues of sampling technologies and the design of the microfluidic systems are considered In particular the use of pre concentrators and solid phase micro extractors to boost the vapour concentration before it is introduced to the chemical sensor or electronic nose

Electronic Noses and Sensors for the Detection of Explosives

J. Gardner, Jehuda Yinon, 2004-08-17 Proceedings of the NATO Advanced Research Workshop held in Warwick Coventry U K 30 September 3 October 2003

Electronic Noses and Sensors for the Detection of Explosives J. Gardner, Jehuda

Yinon, 2014-01-15

Counterterrorist Detection Techniques of Explosives

Avi Kagan, Jimmie C. Oxley, 2021-12-03 Counterterrorist Detection Techniques of Explosives Second Edition covers the most current techniques available for explosive detection This completely revised volume describes the most updated research findings that will be used in the next generation of explosives detection technologies New editors Drs Avi Kagan and Jimmie Oxley have assembled in one volume a series of detection technologies written by an expert group of scientists The book helps researchers to compare the advantages and disadvantages of all available methods in detecting explosives and in effect allows them to choose the correct instrumental screening technology according to the nature of the sample Covers bulk remote trace contact or contact less detection Describes techniques applicable to indoor public transportation human and freight and outdoor vehicle detection Reviews both current techniques and those in advanced stages of development Provides detailed descriptions of every technique including its principles of operation as well as its applications in the detection of explosives

Detection of

Explosives and Landmines Hiltmar Schubert, Andrey Kuznetsov, 2012-12-06 This ARW is the third NATO sponsored

workshop on Explosives Detection and Humanitarian Demining The previous events were Detection and Destruction of Anti Personnel Landmines Moscow 1997 Explosives Detection and Decontamination of the Environment Prague 1997 Over the last decade applied research in Humanitarian Demining has made progress to some extent but according to the tremendous tasks of Demining and the lack of scientific methods for practical detection of explosive devices research activities are still of the same importance than ever before Concerning countermeasures against terrorism the detection of explosives is one of the key factors but the practical applications are not sufficient solved An international exchange of research results are therefore urgent to find out the most promising measures for application The coincidence of this ARW and the terrible disaster of New York and Washington may demonstrate the importance of this task In consequence the explosive device detection technologies can make a major contribution to collective family and individual security In developed countries these technologies provide a strong deterrent and preventative measure against terrorist threats In less developed regions they can improve individual institutional and state security lessening the insecurity that motivates many terrorists acts The elimination of landmine threats is just one of many ways of achieving this However our attempts to meet the extremely difficult technical challenges posed by landmine and UXO contamination are inevitably leading us to new technological approaches

Chemical Sensors Ghenadii Korotcenkov, 2011-11-02 Chemical sensors are integral to the automation of myriad industrial processes as well as everyday monitoring of such activities as public safety engine performance medical therapeutics and many more This massive reference work will cover all major categories of chemical sensor materials and devices and their general functional usage from monitoring and analyzing gases to analyzing liquids and compounds of all kinds This is THE reference work on sensors used for chemical detection and analysis In this final volume of the Chemical Sensors will be found the latest in new chemical sensor applications including remote chemical sensing for such applications as atmosphere monitoring new uses for electronic noses and tongues wireless chemical sensors and new future directions for chemical sensors in industry agriculture and transportation

Vapour and Trace Detection of Explosives for Anti-Terrorism Purposes M. Krausa, 2012-11-06 The fast detection of explosives from the vapor phase would be one way to enhance the protection of society against terrorist attacks Up to now the problem of detection of explosives especially the location of explosives whether at large areas e g station halls theaters or hidden in cars aircraft cargo baggage or explosives hidden in crowds e g suicide bombers or bombs in bags has not been solved Smelling of explosives like dogs do seems to be a valuable tool for a security chain In general different strategies can be adopted to the basic problem of explosive detection bulk detection vapor detection Normally meetings cover both aspects and applications of the detection Even though both methods might fulfill special aspects of a general security chain the underlying scientific questions differ strongly Because of that the discussions of the scientists and practitioners from the different main directions are sometimes only less specific Therefore the NATO Advisory Panel in Security Related Civil Science and Technology proposed a small series of NATO ARW s which

focuses on the different scientific aspects of explosives detection methods This book is based on material presented at the first NATO ARW of this series in Moscow which covered the topic Vapor and trace detection of explosives The second ARW was held in St Petersburg and treated the topic Bulk detection methods The third workshop was held in Warwick and focused on electronic noses which cover a somewhat different aspect of vapor detection

Detection of Explosives Jehuda Yinon, 1999-09-09 Forensic and Environmental Detection of Explosives is the first comprehensive book on the detection of explosives It combines the two main fields of application Forensic detection of explosives the detection of hidden explosives in airfreight luggage vehicles and on suspects Environmental detection of explosives detecting on site explosives in soil and water of contaminated areas and the detection of landmines Dr Jehuda Yinon is a world renowned expert on the analysis of explosives and has served as consulting expert during the Oklahoma bombing trial where his previous book Modern Methods and Applications in Analysis of Explosives was quoted by both the prosecution and defense experts This new book complements the author's previous book on the analysis of explosives It includes the following features Classifications of explosives Explanations of the basic terms related to the detection of explosives Vapor detection methods Probing radiation methods Tagging of explosives Systems integration and performance testing Detection of explosives in contaminated areas Detection of landmines This book is an ideal reference book for those working in forensic and law enforcement agencies concerned with the detection of hidden explosives as well as for environmental scientists dealing with explosives decontamination The book is also recommended as a text book for graduate students in analytical environmental and forensic science

Forensic Investigation of Explosions, Second Edition Alexander Beveridge, 2011-11-02 Now in its second edition Forensic Investigation of Explosions draws on the editor's 30 years of explosives casework experience including his work on task forces set up to investigate major explosives incidents Dr Alexander Beveridge provides a broad multidisciplinary approach assembling the contributions of internationally recognized experts who present the definitive reference work on the subject Topics discussed include The physics and chemistry of explosives and explosions The detection of hidden explosives The effect of explosions on structures and persons Aircraft sabotage investigations Explosion scene investigations Casework management The role of forensic scientists Analysis of explosives and their residues Forensic pathology as it relates to explosives Presentation of expert testimony With nearly 40 percent more material this new edition contains revised chapters and several new topics including A profile of casework management in the UK Forensic Explosives Laboratory one of the world's top labs with a discussion of their management system training procedures and practical approaches to problem solving Properties and analysis of improvised explosives An examination of the Bali bombings and the use of mobile analytical techniques and mobile laboratories The collection analysis and presentation of evidence in vehicle borne improvised explosive device cases as evidenced in attacks on US overseas targets This volume offers valuable information to all members of prevention and post blast teams Each chapter was written

by an expert or experts in a specific field and provides well referenced information underlying best practices that can be used in the field laboratory conference room classroom or courtroom

Trace Analysis with Nanomaterials David T. Pierce, Julia Xiaojun Zhao, 2011-05-25 Presenting a wide variety of methods this book provides a comprehensive overview of the current state ranging from bioanalysis to electrochemical sensing forensics and chemistry while also covering the toxicity aspects of nanomaterials to humans and the environment Edited by rising stars in the field the first section on biological analysis includes an investigation of nanoparticles and micro and nanofluidic systems while the second environmental analysis looks at the detection monitoring and sensing of explosives as well as pollutants among other topics The final part covers such advanced methods as the synthesis and characterization of gold nanorods For analytical chemists materials scientists chemists working in trace analysis and spectroscopists

Electronic Nose Technologies and Advances in Machine Olfaction Albastaki, Yousif Abdullatif, Albalooshi, Fatema, 2018-04-13 The design and study of materials is a pivotal component to new discoveries in the various fields of science and technology By better understanding the components and structures of materials researchers can increase its applications across different industries Electronic Nose Technologies and Advances in Machine Olfaction is an academic scholarly resource that examines the emerging applications of odor sensing devices as well as a better understanding of the designing process with the aid of neural networks and various other technologies Featuring coverage on a broad range of topics including food spoilage detection chemical sensing and olfactometer this book is a vital resource for engineers academicians researchers students and practitioners seeking current research on the advancements in applications of odor sensing devices

Graphene Science Handbook, Six-Volume Set Mahmood Aliofkhazraei, Nasar Ali, William I. Milne, Cengiz S. Ozkan, Stanislaw Mitura, Juana L. Gervasoni, 2016-04-26 Graphene is the strongest material ever studied and can be an efficient substitute for silicon This six volume handbook focuses on fabrication methods nanostructure and atomic arrangement electrical and optical properties mechanical and chemical properties size dependent properties and applications and industrialization There is no other major reference work of this scope on the topic of graphene which is one of the most researched materials of the twenty first century The set includes contributions from top researchers in the field and a foreword written by two Nobel laureates in physics

Graphene Science Handbook Mahmood Aliofkhazraei, Nasar Ali, William I. Milne, Cengiz S. Ozkan, Stanislaw Mitura, Juana L. Gervasoni, 2016-04-21 Size Up the Short and Long Term Effects of Graphene The Graphene Science Handbook is a six volume set that describes graphene s special structural electrical and chemical properties The book considers how these properties can be used in different applications including the development of batteries fuel cells photovoltaic cells and supercapac

Surface and Interface Science, Volumes 9 and 10 Klaus Wandelt, 2020-03-30 In ten volumes this unique handbook covers all fundamental aspects of surface and interface science and offers a comprehensive overview of this research area for scientists working in the field as well as an introduction for newcomers Volume 1 Concepts and Methods Volume 2 Properties of Elemental Surfaces Volume 3 Properties

of Composite Surfaces Alloys Compounds Semiconductors Volume 4 Solid Solid Interfaces and Thin Films Volume 5 Solid Gas Interfaces I Volume 6 Solid Gas Interfaces II Volume 7 Liquid and Biological Interfaces Volume 8 Interfacial Electrochemistry Volume 9 Applications of Surface Science I Volume 10 Applications of Surface Science II Content of Volumes 8 9 Surface Analytics with X Ray Photoelectron and Auger Electron Spectroscopy on Coated Steel Sheets Applications of Graphene Industrial Heterogeneous Catalysis Automotive Catalysis High Throughput Heterogeneous Catalyst Research Development Scale Up and Production Support Industrial Separation of Insulating Particles Triboelectric Charging Friction Friend and Foe Surface Science and Flotation Application of Surface Science to Corrosion Electrons Electrodes and the Transformation of Organic Molecules Self Cleaning Surfaces From Fundamental Aspect to Real Technical Applications Thin Films Sputtering PVD Methods and Applications Wafer Bonding Superconformal Deposition Spintronics Surface and Interface Aspects Device Efficiency of Organic Light Emitting Diodes Dye Sensitized Solar Cells Electronic Nose Current Status and Future Trends Surface Science in Batteries Surface and Interface Science in Fuel Cells Research **Green Analytical Chemistry** Justyna

Płotka-Wasyłka, Jacek Namieśnik, 2019-08-02 The book explains the principles and fundamentals of Green Analytical Chemistry GAC and highlights the current developments and future potential of the analytical green chemistry oriented applications of various solutions The book consists of sixteen chapters including the history and milestones of GAC issues related to teaching of green analytical chemistry and greening the university laboratories evaluation of impact of analytical activities on the environmental and human health direct techniques of detection identification and determination of trace constituents new achievements in the field of extraction of trace analytes from samples characterized by complex composition of the matrix green nature of the derivatization process in analytical chemistry passive techniques of sampling of analytes green sorption materials used in analytical procedures new types of solvents in the field of analytical chemistry In addition green chromatography and related techniques fast tests for assessment of the wide spectrum of pollutants in the different types of the medium remote monitoring of environmental pollutants qualitative and comparative evaluation quantitative assessment and future trends and perspectives are discussed This book appeals to a wide readership of the academic and industrial researchers In addition it can be used in the classroom for undergraduate and graduate Ph D students focusing on elaboration of new analytical procedures for organic and inorganic compounds determination in different kinds of samples characterized by complex matrices composition Jacek Namieśnik was a Professor at the Department of Analytical Chemistry Gdańsk University of Technology Poland Justyna Płotka-Wasyłka is a teacher and researcher at the same department *Modeling and Simulation of Functional Nanomaterials for Forensic Investigation* Rakha, Allah, Munawar, Anam, Khanna, Virat, Bansal, Suneev Anil, 2023-06-12 Nanotechnology continues to contribute to the progress of innovations in the area of forensic science ranging from sensing DNA monitoring and counterfeiting to fingerprinting In recent years functional nanomaterials are widely applied in nanoscience and forensic investigation They can

be used in future interdisciplinary research by scientists engineers and biotechnologists Modeling and Simulation of Functional Nanomaterials for Forensic Investigation focuses on multiple applications related to forensics and provides information linked with nanoparticles This book provides nanotechnology results in improving the sensitivity of established forensic techniques It further focuses on different fabrication and characterization techniques of nanomaterials and relates their characteristics with forensic applications Covering topics such as explosive detection nano forensic testing and nano trackers this premier reference source is a comprehensive resource for material engineers chemical engineers nanotechnologists biotechnologists forensic scientists students and educators of higher education researchers and academicians

Polymeric Sensors and Actuators Johannes Karl Fink, 2012-10-29 The book exhaustively covers the various polymers that are used for sensors and actuators from the perspective of organic chemistry The field of polymeric sensors and actuators is developing very rapidly as newly derived polymer materials are suitable for sensor technology This book uniquely and comprehensively covers the various polymers that are used for sensors and actuators The author has researched both scientific papers and patents to include all the recent discoveries and applications Since many chemists may not be very familiar with the physical background as well as how sensors operate Polymeric Sensors and Actuators includes a general chapter dealing with the overall physics and basic principles of sensors Complementary chapters on their methods of fabrication as well as the processing of data are included The actuators sections examine the fields of applications special designs and materials The final chapter is dedicated to liquid crystal displays The book concludes with four extensive indices including one special one on analytes to allow the practitioner to easily use the text This comprehensive text examines the following sensor types Humidity Sensors Biosensors Mechanical Sensors Optical Sensors Surface Plasmon Resonance Test Strips Microelectromechanical MEMS Sensors Piezoelectric Sensors Acoustic Wave Sensors Electronic Nose Switchable Polymers

Olfaction and Electronic Nose Matteo Pardo, Giorgio Sberveglieri, 2009-06-09 ISOEN addresses research in the fields of gas sensors and artificial olfactory systems In this edition we broadened the participation spectrum to all kinds of analytical instrumentation for odor measurement and to biological olfaction We also had a strong involvement in industry The audience comprises materials scientists chemists physicists engineers biologists computer scientists and application specialists e g food medical environmental security

Encyclopedia of Analytical Science, 2019-04-02 The third edition of the Encyclopedia of Analytical Science Ten Volume Set is a definitive collection of articles covering the latest technologies in application areas such as medicine environmental science food science and geology Meticulously organized clearly written and fully interdisciplinary the Encyclopedia of Analytical Science Ten Volume Set provides foundational knowledge across the scope of modern analytical chemistry linking fundamental topics with the latest methodologies Articles will cover three broad areas analytical techniques e g mass spectrometry liquid chromatography atomic spectrometry areas of application e g forensic environmental and clinical and analytes e g arsenic nucleic acids and polycyclic aromatic hydrocarbons providing a

one stop resource for analytical scientists Offers readers a one stop resource with access to information across the entire scope of modern analytical science Presents articles split into three broad areas analytical techniques areas of application and and analytes creating an ideal resource for students researchers and professionals Provides concise and accessible information that is ideal for non specialists and readers from undergraduate levels and higher Advanced Nanomaterials for Inexpensive Gas Microsensors Eduard Llobet Valero, 2019-11-13 Advanced Nanomaterials for Inexpensive Gas Microsensors Synthesis Integration and Applications presents full coverage in the area of gas sensing nanomaterials from materials transducers and applications to the latest results and future direction Experts present work on metal oxides carbon based and hybrid materials fabrication and application The book brings together three major themes including synthesis functionalization and the characterization of advanced nanomaterials all emphasizing synthesis techniques that ease the integration of nanomaterials in transducers Chapters encompass a wide spectrum of sensing technologies including advanced nanomaterials metal oxides carbon materials and graphene and organic molecular materials and atomic layers MoS₂ The book s authors examine the coupling of sensitive nanomaterials to different types of transducer elements and their applications including direct growth and additive fabrication techniques as a way to obtain inexpensive gas microsensors principal transduction schemes and advanced operating methods

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