1. Record Nr. UNINA9911019627103321

Autore	Lacaze Pierre-Camille
Titolo	Nanotechnologies and Nanomaterials Applied to Chemical Sensors and Biosensors : Applications to the Environment, Medicine and Health
Pubbl/distr/stampa	Newark : , : John Wiley & Sons, Incorporated, , 2024 ©2024
ISBN	9781394317158 1394317158 9781394317196 1394317190 9781394317189 1394317182
Edizione	[1st ed.]
Descrizione fisica	1 online resource (354 pages)
Collana	ISTE Invoiced Series
Altri autori (Persone)	PiroBenoît LacroixJean-Christophe
Soggetti	Biosensors Chemical detectors
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Cover -- Title Page -- Copyright Page -- Contents -- Introduction -- Part 1. Nanomaterials, Amplification, Separation, Recognition and Transduction -- Chapter 1. Nanomaterials -- 1.1. Carbon nanomaterials -- 1.1.1. Fullerenes -- 1.1.2. Carbon nanodiamonds (NDs) -- 1.1.3. Carbon quantum dots -- 1.1.4. Carbon nanotubes -- 1.1.5. Graphene -- 1.1.6. Graphene quantum dots -- 1.2. Inorganic nanomaterials -- 1.2.1. Metal nanoparticles -- 1.2.2. Metal nanoclusters (MNCs) -- 1.2.3. Semiconductor QDs -- 1.2.4. Two-dimensional inorganic lamellar nanosheets -- 1.2.5. Metal organic frameworks (MOFs) -- 1.2.6. Methods for manufacturing MOFs -- 1.3. Conclusions -- Chapter 2. Separation and Amplification Techniques -- 2.1. Principle of the PCR technique applied to the concentration amplification of DNA traces -- 2.2. Sequencing techniques -- 2.3. Separation techniques for product mixtures -- 2.3.1. Chromatography techniques -- 2.3.2. Electrophoresis techniques -- 2.4. Conclusions --

Chapter 3. Recognition Principles -- 3.1. The different molecular or chemical identification techniques -- 3.1.1. Ion detection using synthetic ligands -- 3.1.2. Immunological recognition: antibodies, nanobodies and peptides -- 3.1.3. Identification using nucleic acids: aptamers -- 3.1.4. Recognition by molecularly imprinted polymers -- 3.1.5. Recognition followed by transformation: enzymes and catalysts -- 3.1.6. Recognition of gaseous species -- 3.2. Sensor networks and artificial intelligence -- 3.2.1. Basic principles -- 3.2.2. Application to chemical sensors -- 3.3. Conclusions -- Chapter 4. Physico-chemical Transduction Techniques -- 4.1. Electrochemical methods -- 4.1.1. Potentiometric analysis -- 4.1.2. Voltametric analysis -- 4.1.3. Impedancemetry -- 4.2. Piezoelectricity for gravimetric analysis -- 4.2.1. Quartz crystal microbalance -- 4.2.2. Surface acoustic wave sensors.
4.3. Field effect transistors -- 4.3.1. Operating principle of an FET -- 4.3.2. Main FET devices applied to chemical analysis -- 4.4. Optical and optoelectrochemical detection methods -- 4.4.1. Luminescence of molecules -- 4.4.2. Electrochemiluminescence -- 4.4.3. Photoelectrochemistry -- 4.4.4. Raman scattering spectroscopy -- 4.4.5. Surface- and plasmon-enhanced resonance scattering -- 4.5. Conclusions -- Part 2. Environmental and Biological Sensors -- Chapter 5. Ion and Gas Sensors -- 5.1. Membrane electrodes for potentiometric pH measurement -- 5.2. Ion selective electrodes (ISE) -- 5.2.1. Toward ISEs with very low detection limits -- 5.2.2. Solid contact ISEs -- 5.2.3. Conclusions on ISE electrodes -- 5.3. Gas sensors -- 5.3.1. Gas sensors based on nanostructured metal oxides -- 5.3.2. Gas sensors based on conductive polymers -- 5.3.3. Gas sensors based on two-dimensional thin-film materials -- 5.3.4. Sensor networks and their use in artificial noses -- 5.4. Conclusions -- Chapter 6. Biosensors for Health -- 6.1. Blood sugar, uremia and cholesterol -- 6.1.1. Blood sugar -- 6.1.2. Uremia -- 6.1.3. Cholesterol -- 6.2. Biomarkers -- 6.2.1. Cancer biomarkers -- 6.2.2. Cardiac disease biomarkers -- 6.2.3. Stress biomarkers -- 6.3. Pathogens -- 6.3.1. Virus detection -- 6.3.2. Toxin detection -- 6.4. Conclusions -- Conclusion -- References -- Index -- Other titles from ISTE in Nanoscience and Nanotechnology -- EULA.

Sommario/riassunto

This comprehensive book explores the application of nanomaterials in chemical sensors and biosensors, highlighting their importance in environmental, medical, and health-related fields. It delves into various types of nanomaterials, including carbon-based and inorganic varieties, and their roles in enhancing sensor technology. The book also covers amplification, separation, recognition, and transduction techniques essential for sensor functionality. Targeted at researchers and professionals in nanotechnology, chemistry, and sensor development, the book aims to provide a detailed understanding of how nanomaterials can improve the sensitivity and specificity of chemical sensors and biosensors.