About the Cover

Guest Editors: Corrado Di Natale and Roberto Paolesse

This cover illustrates a schematic of some possible ways to transduce the porphyrin-analyte interaction into a sensor signal. The beautiful richness of porphyrinoid properties allows the development of a wide range of chemical sensors, as illustrated by the contributions reported in this issue.

Articles

pp. 1111–1122
Optical oxygen sensor devices using metalloporphyrins
Yutaka Amao* and Ichiro Okura

A variety of devices and sensors based on phosphorescence or photoexcited state quenching of porphyrin molecules (platinum(II), palladium(II), zinc(II), metal-free, etc.) dispersed in oxygen-permeable polymer film or directly immobilized onto solid surface via the chemical or physical adsorption are developed to measure oxygen concentration on the solid surface. Oxygen-sensing systems are classified into four types; (1) phosphorescence intensity change, (2) phosphorescence lifetime change, (3) change of lifetime of photoexcited triplet state and (4) intensity change of absorption of photoexcited triplet state. In this review the properties of various optical oxygen-sensing devices using porphyrin and sensing system are introduced.

pp. 1123–1128
Multi-transduction of molecular recognition events in metallocporphyrin layers
Corrado Di Natale*, Roberto Paolesse, Arnaldo D’Amico, Ingemar Lundström and Anita Lloyd-Spetz

Metalloporphyrins are characterized by manifold of interactions of different strength and selectivity. These interactions can be differently captured by mass (quartz microbalance) and surface potential transducers (field effect transistor). Field effect transistors preserve the interactions magnitude scale and maintain the original selectivity of the molecular recognition system, while the quartz microbalances tend to smooth the differences between the interaction mechanisms involved.
Contents

PP. 1129–1139
QCM sensors for aqueous phenols based on active layers constituted by tetrapyrrolic macrocycle Langmuir films
Gabriele Giancane, Maria Rachele Guascito, Cosimino Malitesta*, Elisabetta Mazzotta, Rosaria Anna Picca and Ludovico Valli*

Langmuir-Blodgett films of three different metalated tetrapyrrolic macrocycles have been deposited onto the piezoelectric crystals of a flow-through quartz microbalance. The sensing performances of the modified gold electrodes have been investigated by monitoring the frequency variation induced by the presence of several toxic phenols. Floating films at the air-water interface have been thoroughly characterized by UV-visible reflection spectroscopy and Brewster angle microscopy.

PP. 1140–1147
Thin layer porphyrinogen for alcohol-vapor optical sensors
Maria G. Manera, Ludovico Valli, Sabrina Conoci and Roberto Rella*

Thin films of meso-octaethylporphyrinogen with different thickness were deposited on suitable substrates by Langmuir-Blodgett deposition technique in order to realize optical-sensitive active layers using Surface Plasmon Resonance (SPR) technique as transduction methodology, for the detection of alcohol vapors such as ethanol, methanol and isopropanol.

PP. 1148–1158
Tetrapyrrolic compounds as the hosts for binding of halides and alkali metal cations
Mikalai M. Kruk*, Aleksander S. Starukhin, Nugzar Zh. Mamardashvili, Galina M. Mamardashvili, Yulia B. Ivanova and Olga V. Maltseva

The binding of halides and alkali metal cations with porphyrin hosts is reported. The halide ions are complexed with diprotonated porphyrin macrocycle with high affinity and the stable complexes of 1:1 and 1:2 structures with halide ions are formed. The alkali metal cations are trapped with mono-meso-arylporphyrins containing a conformationally mobile complexing polyether fragment on the benzene ring with a terminal pyridine ring. The five-membered polyether chain was shown to provide very high binding selectivity for potassium over lithium or sodium.

PP. 1159–1167
New insights into sensors based on radical bisphthalocyanines
María Luz Rodríguez-Méndez*, Mónica Gay and J. Antonio de Saja

Radical bisphthalocyanines are one of the most interesting sensing materials. Bisphthalocyanines thin films have been successfully used as resistive, optical, mass and electrochemical sensors and they have also been applied in electronic noses and electronic tongues.
pp. 1168–1178
Corrole-based ion-selective electrodes
Larisa Lvova*, Corrado Di Natale, Arnaldo D’Amico and Roberto Paolesse

Different corrole derivatives have been exploited as ionophores for the development of solvent polymeric membrane ion-selective electrodes (ISEs). The selectivity and the working mechanism of developed ISEs have been investigated in detail. Due to their high sensitivity to the background solution pH, it is difficult to obtain highly-selective ISEs using free-base corrole, while Mn and Cu and Fe corrole derivatives are shown to be highly selective correspondingly for chloride ion and hydrophilic anions detection.

pp. 1179–1187
Recent studies of chemical sensors based on phthalocyanines
Zafer Ziya Öztürk*, Necmettin Kılınç, Devrim Atilla, Ayşe Gül Gürek and Vefa Ahsen

In this paper, the effect of coating parameters on sensing properties and sensing mechanism are reviewed. The authors proposed an alternative way to achieve optimal sensor performance: liquid crystalline PCs forming self-ordered thin films of defined area and thickness simply by heating the sample over the phase transition temperature and synthesized mesomorphic and functionalized phthalocyanines, to develop sensors based on mass-sensitive transducers (quartz crystal microbalance, QCM).

pp. 1188–1195
Liquid crystal porphyrins as chemically sensitive coatings materials for chemical sensors
Ali Şems Ahsen, Antoni Segade, Dolores Velasco and Zafer Ziya Öztürk*

Columnar liquid crystal porphyrin compounds have been deposited onto the gold pad of quartz crystal microbalances (QMBs). The sensitivities of the resulting sensors have been measured with respect to volatile organic compounds (VOCs) and have been found to be of interest for future applications. The results show a strong influence of the length of the side alkyl chains, but the thermal history of the coated film also affects the measured properties.