GRUPPO DIVISIONALE SENSORI

Divisione di Chimica Analitica

SOCIETÀ CHIMICA ITALIANA

Assemblea costitutiva del gruppo Divisionale e primo workshop di rassegna delle attività

venerdì 11 Maggio 2006 presso il Dipartimento di Chimica dell'Università "La Sapienza" (Sala Parravano)

Attività di ricerca di UNIBA

Nicola Cioffi, Elvira De Giglio, Francesco Palmisano, Luisa Torsi, Luigia Sabbatini & Pier Giorgio Zambonin

Amperometric biosensors

NON-CONDUCTING THIN FILMS WITH BUILT-IN SELECTIVITY → ENZYME IMMOBILIZATION → Fast response, Interference-free biosensors

Anal. Chem. **2002,** *74,* 5913−5918

Articles

A Disposable, Reagentless, Third-Generation Glucose Biosensor Based on Overoxidized Poly(pyrrole)/Tetrathiafulvalene−Tetracyanoquinodimethane Composite

Francesco Palmisano* and Pier Giorgio Zambonin

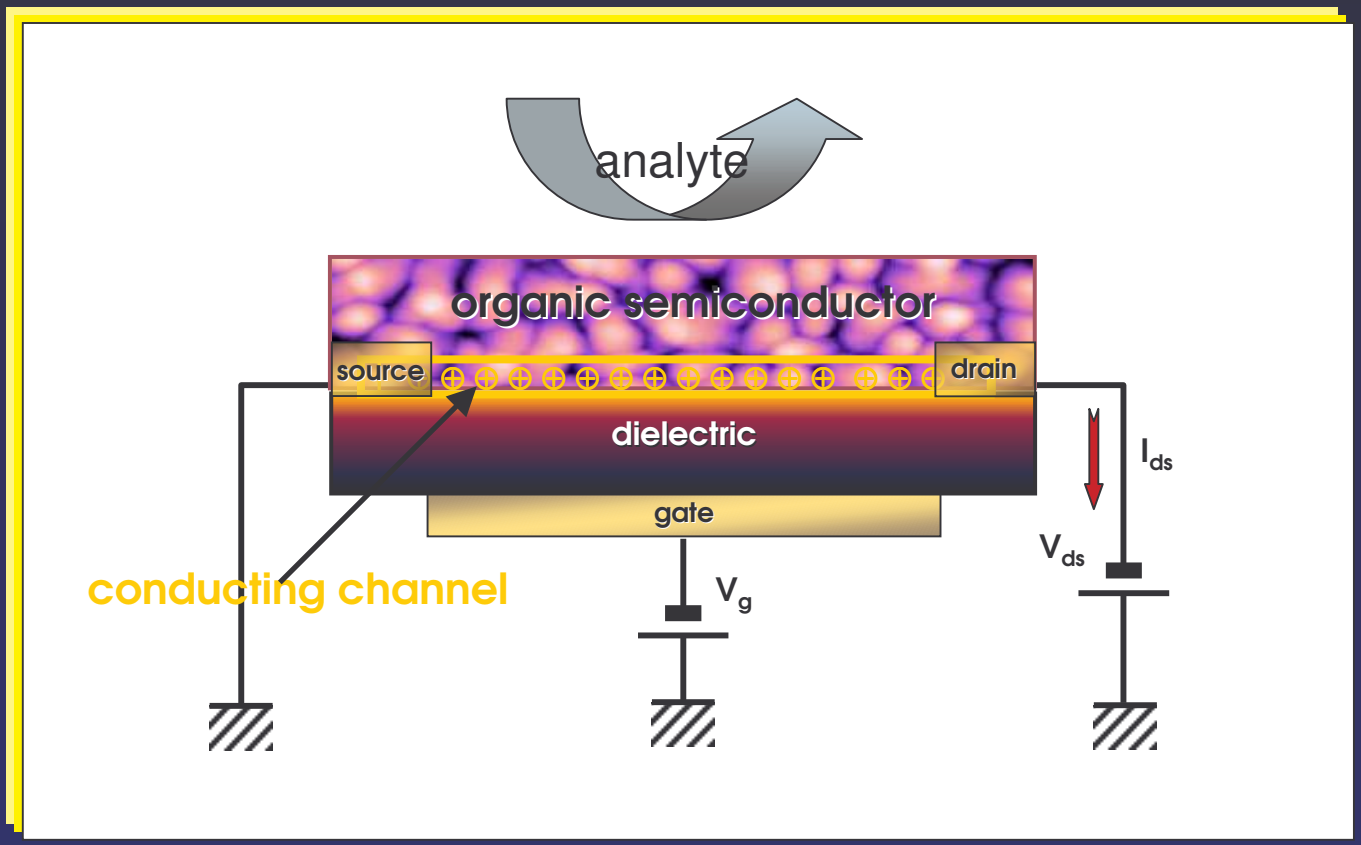
Dipartimento di Chimica, Università di Bari, Via Orabona, 4-70126 Bari, Italy

Diego Centonze and Maurizio Quinto

Istituto di Preparazioni e Produzioni Alimentari, Facoltà di Agraria, Università di Foggia, Via Napoli, 25-71100 Foggia, Italy

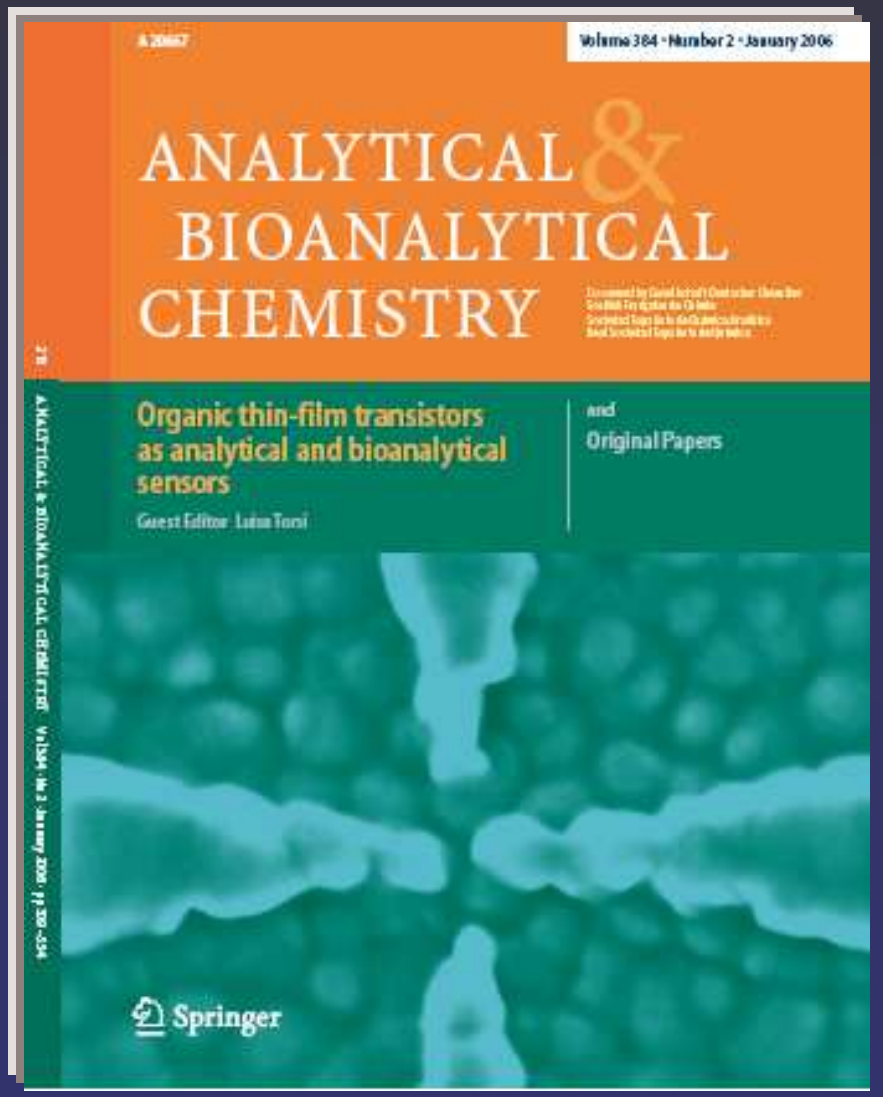
NON CONDUCTING POLYMERS → MOLECULAR IMPRINTING → BIOMIMETIC SENSORS

OTFT gas sensors



A. Tsumura, H. Koezuka and T. Ando, Appl. Phys. Lett., 49, 1210, 1986 (1° OTFT)
H. Laurs and G. Heiland, Thin Solid Films 149 (1987) 129-142
L. Torsi, A. Dodabalapur, L. Sabbatini, P.G. Zambonin,
Sensors and Actuators B., 67, 312, 2000.

OTFT sensors: un campo giovane ed in espansione



Luisa Torsi and Ananth Dodabalapur, Analytical Chemistry, 70, 381A-387A (2005).
Luisa Torsi, Analytical and Bioanalytical Chemistry, 384(2), 309 (2006).

Sensor repeatability

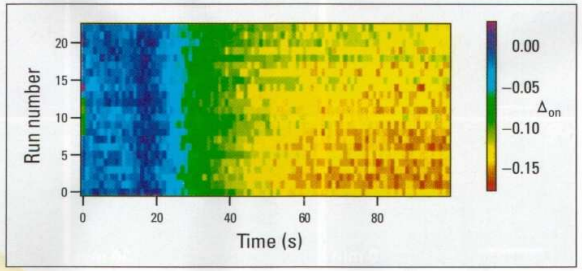
news
analytical
chemistry Marc 2003

ANALYTICAL CURRENTS

Thin-film vapor responses

Whether they are called electronic noses, tongues, or simply sensors, olfactory-mimicking detectors have become a major research arena. L. Torsi, A. Dodabalapur, H. Katz, and co-workers at Lucent Technologies and Università degli Studi di Bari (Italy) provide some framework for this research by investigating the relationship between thin-film molecular structure and morphology and device response. Using 1-pentanol as the analyte, they found that the response is greater when the number of grain boundaries of the film increased. However, the relationship is more complicated with octanonitrile as the analyte.

Various oligothiophene thin films on silicon wafers were studied in this report. For example, thin films of α,ω-dihexyl-α-hexathiophene grown at room temperature were found to consist of small, irregular nanodomains, which probably helped vapors penetrate into the material. Films grown at 120 °C or higher were more regular and lamellar in detail and did not respond as well to pentanol vapors. On the other hand, the response to octanonitrile was independent of film morphology.



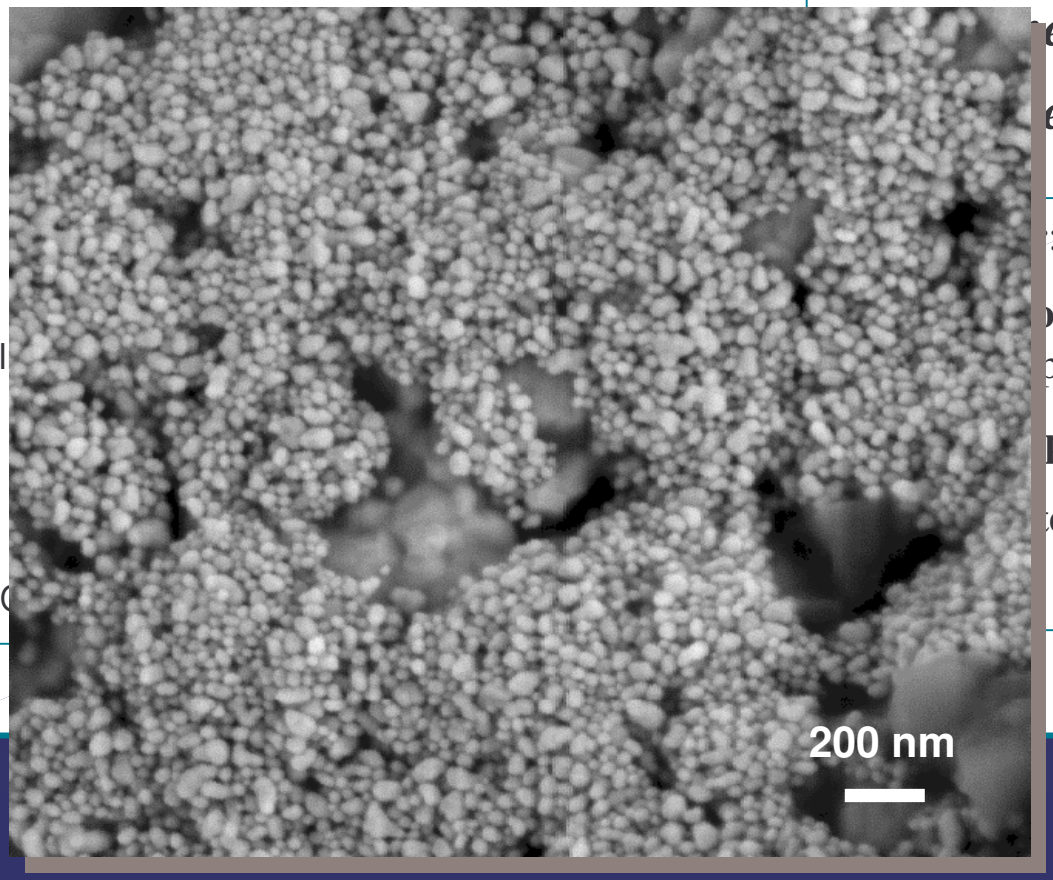
Color-coded changes in the current of a thin-film "electronic nose" sensor to 25 exposures of 1-pentanol.

Other factors investigated included the film's thickness, the chain length in a series of alkyl-substituted hexathiophenes, and the behavior of a short oligomer thiophene. The researchers believe that vapor analyte adsorption is controlled by favorable hydrophobic interactions between the semiconductor and analyte, intercalation to fill defect vacancies, and surface binding. (*J. Phys. Chem. B* **2002,** *106,* 12,563–12,568)

B. Crone, A. Dodabalapur, A. Gelperin, L. Torsi, H.E. Katz, A.J. Lovinger, and Z. Bao, Appl. Phys. Lett., 78, 2229, 2001.

L. Torsi et al. J. of Physical Chemistry B 106 (48) , 12563 12568 (2002).

Gold nanoparticles: NOx gas sensing application



ematic view of the

eld Effect Gas Sensor

: $SiO_x/SI_3N_4/SiO_2$

ntact: alloyed Ni with $TaSi_x$
posited on the top

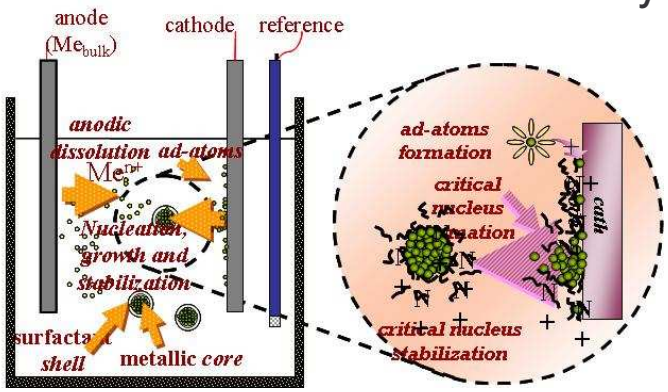
pad: Ti/Pt layers

erial: Au-NPs

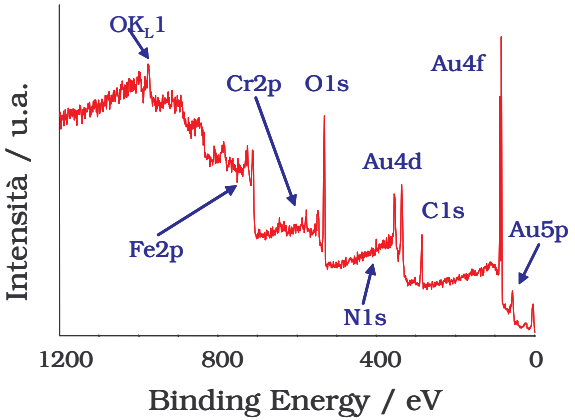
E. Ieva, L. Colaianni, N. Cioffi, L. Torsi, L. Sabbatini, G.C. Capitani, K. Buchholt, A. Lloyd Spetz, Sensor Letters submitted

Functional nanoparticles for sensing applications

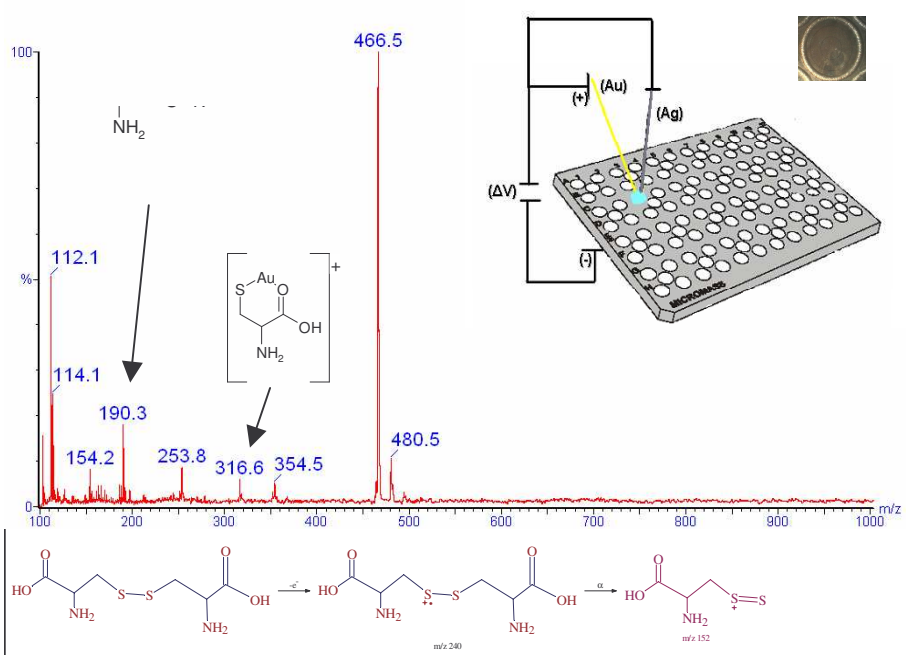
Electrochemical & chemical synthesis



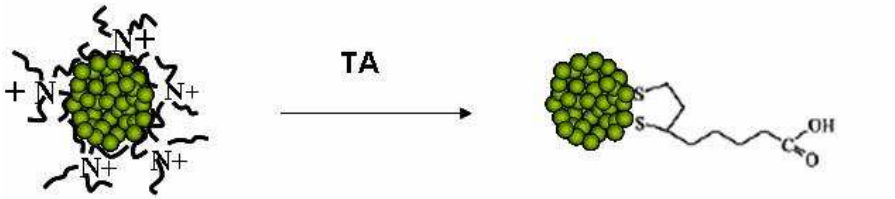
XPS characterisation



Characterization by MALDI-MS



Surface (bio-) or (chem-) functionalisation



QCM & dissipation in-flow measurements

N. Cioffi, L. Torsi, L. Sabbatini, F. Palmisano, P.G. Zambonin

On-going projects:

- National Coordinator of the Italian PRIN-06 Project - 2006037708 - "Plastic bio-FET sensors"

- Responsible for the project "Detection of toxic gas sensors (NO, CO and H2S) at the 20-50 ppm level: proof of concept" with prof. S. Mhaisalkar granted by the Singaporean Defense Science Foundation.

- T.I.R.E.S. Centre of Excellence of the University of Bari "Innovative Technologies for Signal Detection and Processing".