

New iron sensors for detection of food containing protein freshness

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Abstract

In recent years, more attention has been focused on the efficient detection of chemical pollutants, especially small volatile organic compounds (VOCs) and hazardous gases (HGs), using various electronic sensors. This area is constantly growing given the current challenges in highly toxic molecules detection considering global human and animal feeding issues. In particular, the detection of relatively volatile molecules at room temperature, is challenging at low concentration levels, and there is therefore a need to develop new sensitive and low-cost sensors.¹ Compared to e-sensors, coordination complexes present several assets in the context of food chemistry. In particular taken into account contamination of cereal products with acrylamide and asparagine which needs full attention of the chemist community. In this context, we draw our attention to a new series of iron precursors, i.e. mononuclear complexes,² able to detect at real time, and with a high selectivity and ultra-sensitivity, 32 different VOCs and HGs.³ In particular amines, which are detected rather quickly (< 10 min) and with a very high sensitivity. The detection is accompanied by significant and fast colour changes detectable by the naked-eye at ambient conditions. But not only, since the detection can be achieved using simple and intuitive standard chemometric means with a handful smartphone-based analytical method. In addition to their high thermal stability (up to 175 °C), colorimetric sensors showed excellent reusability by consecutive cycles of adsorption–desorption. These sensors are low-cost, environmentally friendly, easy to use, and show excellent and fast detection performances. Such features were exploited in food freshness detection for three sorts of meat (beef, chicken and pork).^{3,4}

Biography



Prof. Yann Garcia has published more than 300 papers with several cover pages of top chemistry journals, 13 book chapters in Inorganic Chemistry, a Wiley-VCH and two patents. h-index = 58 (15589 citations, GScholar, April 2024). He is associate editor of the Mössb. Eff. Ref. Data J. (CAS) and Chem. Synth. (OAE Pub, China). He chairs the Mössbauer French Speaking Society (www.gfsm.fr), and is IBAME vice chair (IBAME.org) of the International Mössbauer community since 2021. He promotes the development of chemistry at the highest level, among the next generation of Moroccan chemists within the oriental region. He co-chaired the International Conference on Advanced Materials, Nanosciences and Applications (ICAMANA 2019 Oujda and 2022 LLN) and two training schools on Nanochemistry, in collaboration with UMP Oujda.

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Recent Publications

1. L. Sun, W. Li, Y. Garcia, 'Mössbauer Spectroscopy: Applications in Chemistry and Materials Science'. Wiley VCH 2024
2. L. Sun, A. Rotaru, K. Robeyns, Y. Garcia, Ind. Eng. Chem. Res. 60 (2021) 8799.
3. L. Sun, A. Rotaru, Y. Garcia, J. Hazardous Mater. 437 (2022) 129364. **IMCN news.**
4. W. Li, L. L. Sun, C. Liu, A. Rotaru, K. Robeyns, M. L. Singleton, Y. Garcia, J. Mater. Chem. C 10 (2022) 9216. **Hot paper. Front cover.**
5. W. Li, A. Rotaru, M. Wolff, S. Demeshko, F. Meyer, Y. Garcia, J. Mater. Chem. C 11 (2023) 11175.