



Microbial biosensors for analytical applications

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The word “biosensor” was used for the first time in 1966, according to our traditional reference databases. The word means that a biological element (nucleic acid, proteins, whole cells, ...) will serve to sense an event or the presence of a substance that interacts with it. However, the “zero age” started long before 1966, with the first publication on a sensor in 1903, the concept of which was interestingly used by biologists to propose a new approach to measurements, traditionally the realm of chemists and physicists. This revolutionary concept allowed an incomparable increase in detection possibilities, since the diversity of proteins or antibodies is vast or can be designed to sense any kind of target.

What about microbial biosensors? The first study in the 1980s was courageous, since bacteria and yeast are heavier than an enzyme; hence, there are many problems associated with staying in contact with the transducer. Despite these difficulties, interest is immense and brings to the world of sensing technologies the ability to measure activities or effects towards substances or mixtures with applications in environment, health, or food sciences that other biosensors are not able to perform. With 2323 publications in 2017, this field accounts for 12% of the global publications on biosensors (Fig. 1).

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Fifty years after the initial idea, biosensors remain an exciting hybrid world in which biologists, chemists, physicists, engineers, and computer engineers combine their knowledge for the design of a specific device with a high degree of complexity, but with the goal of being easy to use for end users, especially for whole-cell systems. Nevertheless, developments in technology, biology, computer science, and materials science have progressed at great speed. This special issue will show you some aspects of the field of microbial biosensors, mainly driven by new technologies (materials science, Lab on a Chip, ...), which was also the case more than 50 years ago for the first oxygen sensor.

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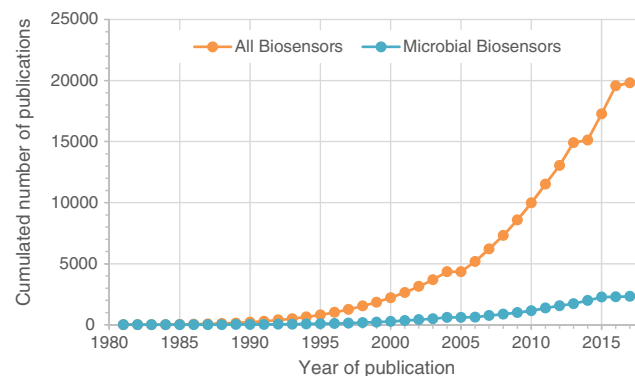


Fig. 1 Global production of publications (articles and books) on biosensors and microbial biosensors from 1981 to 2017. (source: pubmed - biosensor*[Title/Abstract] and (biosensor*[Title/Abstract]) AND ((microbial OR bacterial OR bioreporter* OR Yeast))



Gérald Thouand received his PhD degree in microbiology from the University of Nancy, France, in 1993. He is a tenured professor in microbiology at the University of Nantes. Deputy for Research Innovation at the French Ministry of Research (DRRT Pays de La Loire) and Auditor at the Institute of Higher Studies for Science and Technology (IHEST, Paris), his research interests include environmental monitoring of biodegradation and biotechnology using microbial biosystems.

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