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Using analyte peptidomimetics in the design of new electrochemical biosensors

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Electrochemical immunosensors for small analytes have been a great addition to the analytical toolbox due to their high sensitivity. In these systems the analyte is detected when it competes for binding to the detecting antibody with a tracer compound. The synthesis of the tracer is time consuming and the performance of the assay is greatly influenced by factors related to the preparation of these conjugates. An alternative is the use of analyte peptidomimetics expressed on the surface of phage particles. Phage particles are viruses that infect bacteria using the host bacteria as a factory for its own replication. A vast repertoire of candidate peptides can be expressed in phage-displayed peptide libraries, where randomly generated amino acid sequences are genetically fused to coat proteins of the filamentous phage M13 of the fd family. In this work we introduce the use of two types of phage particles carrying different peptides, in which one target analyte mimics as a replacement for conventional tracer while the other recognizes the immune complex formed between the analyte and the antibody. These phage particles allowed making competitive and noncompetitive immunoassays, respectively. As a proof of concept, we developed a magnetoelectrochemical immunosensor (EI) for two different herbicides and compare its performances with conventional formats. Compared to the conventional ELISA, the EI was faster (minutes), performed with a much wider linear range and the detection limit was lower. The use of phage particles in immune electrochemical assays appears as a promising tool for further developments in the field.

Biography

Hector Fernandez has received his PhD in the Universidad Nacional de Río Cuarto (UNRC), Argentina (1974-1978) and was a Postdoctoral Research Associate with Robert Osteryoung at the University of New York at Buffalo, USA. Currently, he is working as a Full Professor at the UNRC. He was Dean of the Facultad de Ciencias Exactas (UNRC, 1992-1999). He has authored more than seventy research articles and book chapters and has been the editor of a book. He is a member of the National Council of Scientific and Technological Research (CONICET, Argentina) as a Principal Researcher. He is an AAQA, AAIFQ, SIBAE and ISE fellow and has been honored as President of Asociación Argentina de Químicos Analíticos (AAQA, 2007-2009) and representative of AAQA in the Red Iberoamericana de Química Analítica (RIQA, 2010-2011).

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