Environment

Development of Electrochemical Genosensors for the Detection of Toxic Dinoflagellate *Alexandrium spp.*

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Microalgae represent a photosynthetic microorganisms' group that inhabit both salt and fresh waters. These microorganisms, namely several species of dinoflagellates (e.g. *Alexandrium spp*.)[1], are mostly harmless; however, some species produce toxins classified as unsafe to human health. The uncontrolled proliferation of such species results in a hazardous occurring event designated harmful algal blooms (HAB). The effects of these episodes can lead to severe ecological and socio-economic impacts (e.g. decrease of the local tourism, fishing and port activities, the contamination or death of the nearby wildlife, discoloration of the beach coasts). Therefore, the need for a rapid, selective and in real time detection device that can monitor the presence of these microalgae in aquaculture waters is critical to prevent human, ecological and economical losses.

In this work, an analytical approach based on electrochemical genosensor techniques was developed to create a low-cost platform able to detect the dinoflagellates: *Alexandrium minutum* and *Alexandrium ostenfledii*.

The design of this genosensor consisted of several steps including: i) Sensing phase: Creation of a mixed self-assembled monolayer (SAM) composed by a linear DNA capture probe (DNA-CP) and mercaptohexanol (MCH) onto screen-printed gold electrodes (SPGE) surface; ii) Heterogenous hybridization of complementary DNA sequence (DNA target) by using a sandwich format assay with enzymatic labels and iii) Electrochemical detection by chronoamperometry using an enzymatic scheme to amplify the electrochemical signal (**Figure 1**).

The best analytical conditions were used to study the relationship between electrochemical signal and DNA target concentration.

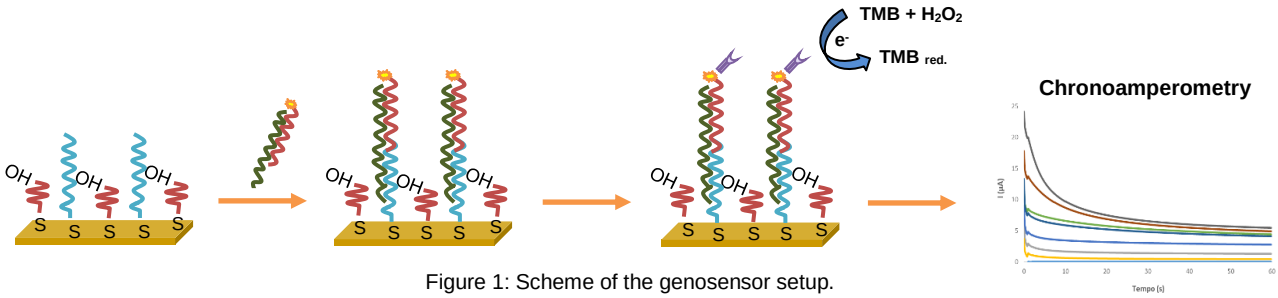

Figure 1: Scheme of the genosensor setup.

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References:

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