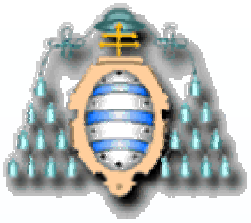

Specific Detection of *Legionella pneumophila* using Hairpin-DNA Probes Immobilized on Screen-printed Gold Electrodes

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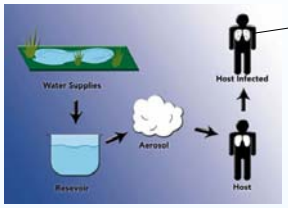
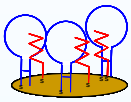
Legionella pneumophila



Legionella pneumophila is one of the most common pathogenic species in the world. This bacterium can be found in environmental water sources and cause sporadic as well as epidemic cases of Legionnaires' disease. Although infection with non-pneumophila Legionella species (*L. longbeachae and L. micdadei*) can occur, its virulence is much lower.

SELF-ASSEMBLED MONOLAYERS, SAMs

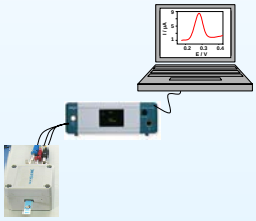


Self-assembly of thiolated single-stranded DNA with a spacer thiol onto gold electrodes allows obtaining well defined and organized surfaces that constitute an excellent platform for biosensor applications. Moreover, highly specific genoassays under non-stringent conditions are possible using structured DNA probes such as DNA hairpins.

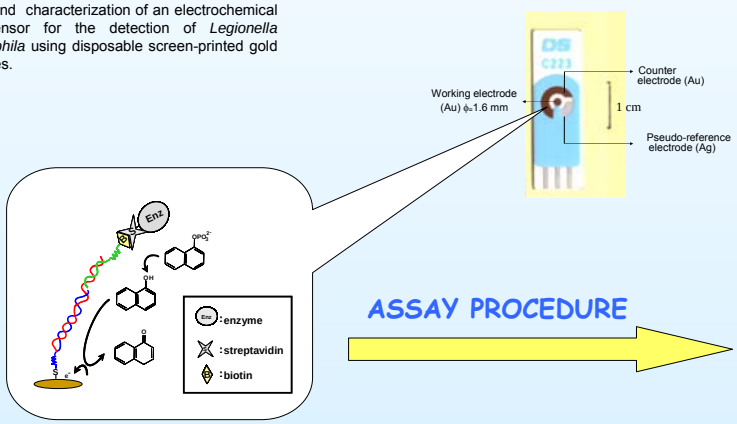
OBJECTIVE

Design and characterization of an electrochemical DNA sensor for the detection of *Legionella pneumophila* using disposable screen-printed gold electrodes.

INSTRUMENTATION



In recent years an increasing interest in the development of electrochemical devices for detecting DNA sequences has been shown. The availability of disposable printed gold electrodes greatly facilitates the development of genosensors making possible *in situ* analysis.



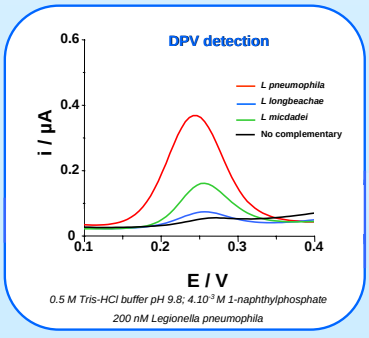
ASSAY PROCEDURE

- Sensing phase
  - Hairpin-DNA modification (2μM DNA, 60 min)
  - Blocking step (4.5 mM mercaptohexanol, 30 min)
- Hybridization
  - Homogeneous hybridization (out of the electrode): Target-biotinylated signalling probe complexes
  - Heterogeneous hybridization (onto the electrode): Three-component duplexes
- Enzyme labelling
  - Streptavidin-alkaline phosphatase conjugate (10 min)
- Electrochemical detection of enzyme activity
  - 4mM 1-naphthylphosphate, 10 min, Room temperature

ANALYTICAL CHARACTERISTICS

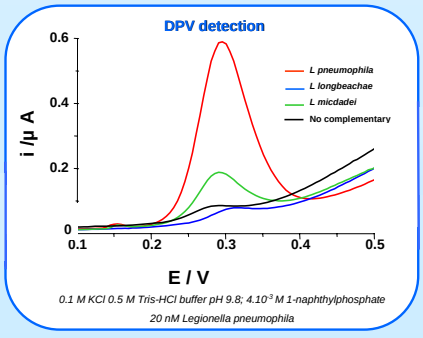
	Screen-printed gold electrode	Conventional disk gold electrode
Sample volumen	40 μL	200 μL
LOD	(15.2 femtomoles)	(68 femtomoles)
Lineal range	$(2.10^{-10}$-$2.10^{-8})$M	$(2.10^{-10}$-$2.10^{-6})$M

CONVENTIONAL DISK GOLD ELECTRODE



0.5 M Tris-HCl buffer pH 9.8; 4.10⁻³ M 1-naphthylphosphate
200 nM Legionella pneumophila

SCREEN-PRINTED GOLD ELECTRODE



0.1 M KCl 0.5 M Tris-HCl buffer pH 9.8; 4.10⁻³ M 1-naphthylphosphate
20 nM Legionella pneumophila

CONCLUSIONS

Screen-printed gold electrodes are suitable for the detection of DNA hybridization. This platform allows a 52-mer DNA sequence to be detected at lower levels. Moreover, it increases the discrimination between *L. pneumophila* and *L. longbeachae* or *L. micdadei* under identical non-stringent conditions.

ACKNOWLEDGMENT

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