DUAL SENSOR BASED ON GOLD NANOSTRUCTURED SCREEN-PRINTED CARBON ELECTRODES FOR THE DETECTION OF PROSTATE SPECIFIC ANTIGEN (PSA)

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In this work an electrochemical immunosensor for the simultaneous detection of free and total Prostatic Specific Antigen (PSA) is developed, using gold nanostructured screen-printed carbon electrodes (SPCEs) as transducers (Figure 1).

Nanostructuration of the electrodic surface is carried out following an electrochemical method which consists in the *in situ* electrodeposition of gold at a constant current for an adequate time. The surface of the gold nanostructured SPCEs obtained is the one shown in Figure 2.

The presence of gold nanoparticles improves the adsorption of proteins on the electrode surface. Thus, this advantage is used to design the immunosensor for detection of PSA following a sandwich format assay that is carried out on the electrode surface.

First of all, an anti-PSA antibody is adsorbed on the gold nanostructured SPCEs, followed by a blocking step with casein; the sensing phase obtained in this way is very stable and reproducible. After that, the sandwich format assay is carried out using the PSA or sample, a biotinylated anti-PSA antibody and streptavidin labeled with alkaline phosphatase. The detection is performed using an electrochemical substrate that consists in a mixture of 3-indoxyl phosphate and silver ions. After the enzymatic reaction, the enzymatically reduced silver is detected by anodic stripping voltammetry [1].

The use of gold nanostructured electrodic surfaces as transducers gives rise to very sensitive immunosensor devices for the simultaneous detection of both free PSA and total PSA at low levels of concentration (0.5 ng/mL - 10 ng/mL), within the clinical significant range for diagnosing prostatic cancer.

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References:

[1] P. Fanjul-Bolado, D. Hernández-Santos, M.B. González-García, A. Costa-García, Anal. Chem. **79** (2007) 5272.

Figures:

Figure 1

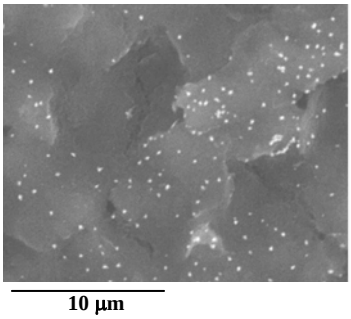

Figure 2