DNA DETECTION USING AMORPHOUS SILICON SENSORS WITH GOLD NANOPARTICLES

Leonardo Silva[1], Elvira Fortunato[1], Hugo Águas[1], Gonçalo Doria[2], Pedro Baptista[2], and Rodrigo Martins[1]

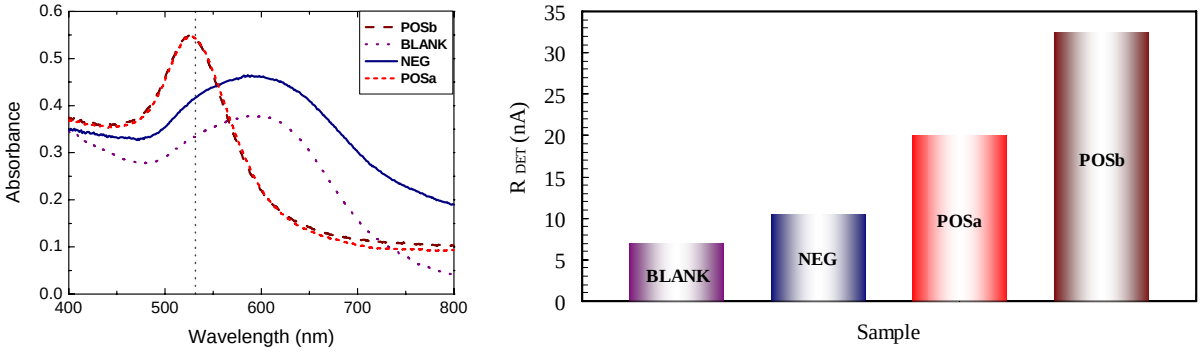
[1]CENIMAT/I3N, Materials Science Department,

[2]CIGMH/SABT, Biotechnology Department, Campus de Caparica, 2829-516 Caparica, Portugal

Tel: +351212948562; Fax: +351212948558

elvira.fortunato@fct.unl.pt

Advances in nanosciences are having a significant impact in many areas of research on nearly every industry. The impact of new nanotechnologies has been particularly large in biodiagnostics, where a number of nanoparticle-based assays have been introduced for biomolecules detection extending the limits of molecular diagnostics to the nanoscale. The applications of nanoparticles have largely focused on DNA-functionalised gold nanoparticles used as the target-specific probes. These gold nanoparticle-based systems can be used for the detection of specific sequences of DNA or RNA. Gold nanoparticles derivatised with thiol modified oligonucleotides complementary to DNA targets - Au-nanoprobes - are used to distinguish fully complementary from mismatched sequences. Here a rapid and inexpensive colorimetric nanoparticle-based method for mismatch detection in DNA using an optoelectronic platform samples is reported [1,2]. The device integrates an amorphous/nanocrystalline biosensor and a light emission source with a gold nanoprobe for specific DNA / RNA detection. This low cost, fast and simple optoelectronic platform permits detection of few picomole of nucleic acid without target or signal amplification making it suitable for application in population diagnostics and in point-of-care hand–held devices.



a) b)

Figure – Comparison between the results obtained by using the conventional method (a) with those ones using the new optoelectronic platform (b), using exactly the same biological samples. The new method besides the DNA identification enables also its quantification (see figure b, POSa and POSb).

[1] R. Martins, P. Baptista, L. Raniero, G. Doria, L. Silva, R. Franco, E. Fortunato, Applied Physics Letters 90 (2007) 023903

[2] Patent pending (September 2006, nº 103 561).