Abstract Title

A nanoelectrode-based DNA sensor

Symposium Track

Authors' names

Maruccio G, Primiceri E, Arima V, Della Torre A, Marzo P, Pellegrino T, Cingolani R, Calabi F, Rinaldi R

Authors' affiliations

National Nanotechnology Laboratory of CNR-INFM, Unità di Ricerca IIT, v. Arnesano 16, 73100, Lecce, Italy

Abstract body

The increasing use of microarray technology requires the availability of DNA sensors that are highly sensitive, yet are robust and can be easily multiplexed at very high level. Most current sensors for the detection of DNA by hybridization are optically based and require relatively expensive reagents and detection equipment. We are investigating the use of DNA sensors based on nanoelectrodes. Gold nanotips (tip spacing 20 - 50 nm) are fabricated by electron beam lithography on SiO_2 substrates or by the mesa-gap technique which allows the fabrication of large-scale nanojunction-arrays [1]. 5'-SH-DNA capture probes are immobilised in the inter-electrode gap following functionalization by mercaptosilane or directly on the metal electrodes. The influence of target concentration as well as environmental conditions (ionic strength, temperature etc.) on the probe-target hybridization and the conductivity of the device upon hybridization to target oligonucleotides coupled to gold nanoparticles is investigated. Our approach differs from a previously published scheme [2] in two critical features: i.) smaller size of the inter-electrode gap; ii.) lack of a requirement for a silver deposition step. Preliminary results and potential applications to real-time quantitation will be discussed.

Keywords

Nanoelectrodes, DNA sensor

References

[1] R. Krahne, A. Yacoby, H. Shtrikman, I. Bar-Joseph, T. Dadosh, J. Sperling, Fabrication of nanoscale gaps in integrated circuits, Appl. Phys. Lett. 81, 730-732 (2002)
[2] S.Park, T.A.Taton, C.A.Mirkin, Array-based Electrocal Detection of DNA with Nanoparticle Probes, Science, 295, 1503-1506 (2002)

Corresponding author contact information

Calabi F, National Nanotechnology Laboratory of CNR-INFM, v. Arnesano 16, 73100, Lecce, Italy, Tel. 0039 0832 298 210, Fax. 0039 0832 298 237, e-mail: franco.calabi@unile.it