

ULTRASENSITIVE DETECTION OF DNA BY PNA AND NANOPARTICLE-ENHANCED SURFACE PLASMON RESONANCE IMAGING

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A major challenge in the area of DNA microarray and DNA biosensors is the development of rapid and multiplexed methods that do not require the labeling and the polymerase chain reaction (PCR) amplification of the genetic samples. Both the above steps increase the cost of the assay and the complexity of the DNA detection. In this perspective, recent literature pays great attention toward label-free methods able to perform DNA analyses with high-throughput, low sample consumption and ultrasensitivity (sensitivity as high as 1 pM helps in avoiding the PCR amplification step). The ability to identify single nucleotide polymorphisms (SNPs) in DNA samples represents a further critical point when combined to the above mentioned required properties for a new DNA analysis method.

In this communication the results we obtained by combining the surface plasmon resonance imaging (SPRI) biosensing to the peptide nucleic acids (PNA) improved selectivity and sensitivity in targeting complementary DNA sequences will be presented. The method is based on the nanoparticle amplification of the SPRI response and allowed to obtain a 1 fM sensitivity in single-base mismatch discrimination. Single-base mismatch discrimination was obtained by using 150 zeptomoles of the DNA target molecules. The advantages offered by the coupling of microfluidic devices with the SPRI apparatus will be also discussed.

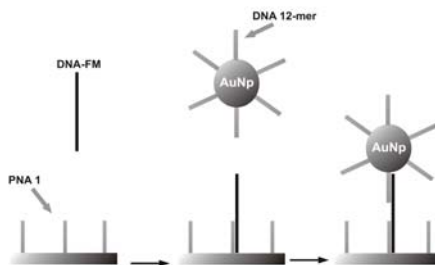


Figure 1. Scheme of the detection of target DNA by using a the nanoparticle amplification of the SPRI response.