

REVEALING THE MECHANISM OF SNP DETECTION WITH GOLD NANOPROBES BY NON-CROSS-LINKING AGGREGATION

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The impact of advances in nanotechnology has been particularly relevant in molecular diagnostics where gold nanoparticle based assays have been developed for specific detection of bioanalytes of clinical interest^[1]. Recently, we presented a colorimetric method for the detection of single base mutations/single nucleotide polymorphisms (SNP) based on the differential non-cross-linking aggregation of gold nanoparticles derivatized with thiol-modified oligonucleotides - Au-nanoprobes - upon hybridization with complementary DNA target^[2]. The detection is based on the color difference upon salt addition between solutions containing the Au-nanoprobe and either complementary or mismatched/non-complementary target. These color differences are induced by shifts of the surface plasmon resonance (SPR) band of the gold nanoparticles, and are directly related to the level of Au-nanoprobes aggregation - red color of dispersed Au-nanoprobes turns blue upon aggregation.

Here, we try to elucidate the underlying mechanism that allows for single base mismatch resolution detection of DNA targets at room temperature. Using fluorescent spectroscopy and zeta potential measurements, we determined more DNA molecules binding to the Au-nanoprobe for fully complementary targets than for those harboring a mismatch. Non-complementary targets showed only residual binding, hardly distinguishable from background noise. The higher number of negatively charged DNA molecules bound provides a greater repulsive force between Au-nanoprobes, thus higher stability against salt induced aggregation.

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References:

[1] Baptista *et al.*, Anal Bioanal Chem, **Epub ahead of print** (2007).

[2] Doria *et al.*, IET Nanobiotech, **1** (2007) 53-57.

Figures:

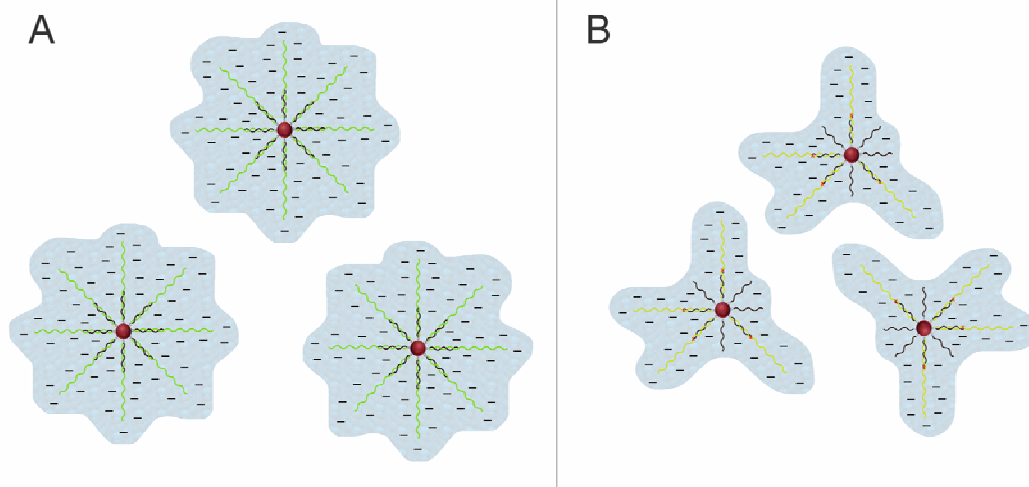


Figure 1- Model of the electrostatic field of targets hybridized with Au-nanoprobe - (A) fully complementary and (B) single base mismatch