Heatsens: ultralow detection of cancer markers

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Heatsens biosensor technology can be used to detect very quickly the presence, at ultralow concentrations, of an important tumoral marker like CEA.

SITUATION

Current sensing platforms are not yet fast enough or always reliable or affordable, in particular, when **ultralow detection** is required. Time-cost and sensitivity are among the most important limitations of current sensing methods. Although the development of ultralow sensing platforms has been mainly focused on **clinical diagnosis**, their use is increasingly demanding in other fields such as **food safety** regulations, **environmental** policies, **pharmacology** or **military applications** where ultralow detection is the only way.

APPROACH

Gold nanoprisms derivatized with antibody against carcinoembryonic antigen (anti-CEA) are used to label CEA molecules and **imprint thermal signals** upon illumination, enabling **sensitivities up to the attomolar range in real patient samples**.

RESULTS

The intensity and the area of developed signals increase as the concentration of the added CEA was raised, and qualitatively, these different signals can be connected to different concentrations of CEA.

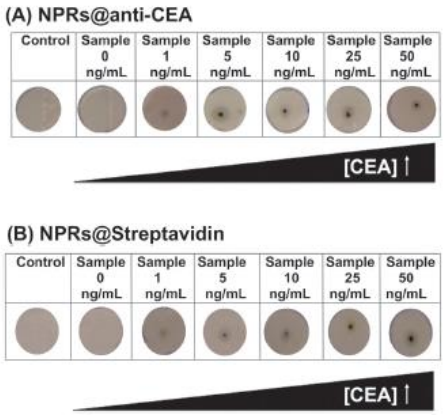

Figure 2_ Thermal signals developed after NIR illumination for two sensing platforms involving CEA detection using (A) anti-CEA derivatized NPRs and (B) streptavidin derivatized NPRs.

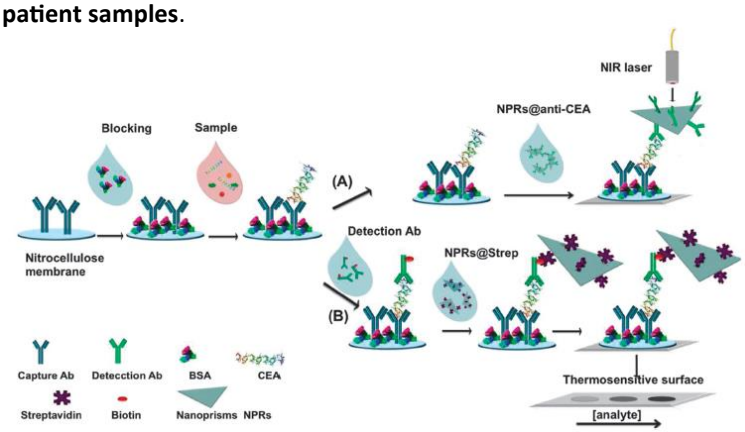

Figure 1_ Schematic representation of the two approaches developed. Step-by-step processes for the formation of the Immune-complex using (A) anti-CEA derivatized NPRs and (B) streptavidin derivatized NPRs, enabling thermal sensing upon NIR illumination.

HEATSENS technology is based on the heat generated by gold nanoprisms when they are irradiated with an external light source, resulting in better specificity, higher sensitivity, and shorter analysis time.

Phone. +34 976 369 300 Email. info@nanoimmunotech.es