

Rapid & Multiplexing Digital Biomarker Detection with a Point-of-Care (or Portable) (Nano) Plasmonic Sensor

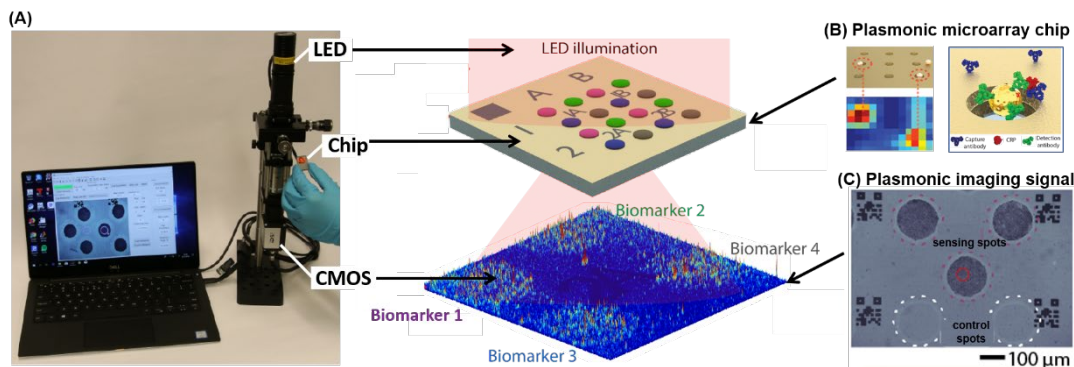


Illustration of the biosensor and its working principle. (A) Photo of the portable and low-cost nanoplasmonic sensor. Optical detection path and key components are highlighted. (B) Antibody functionalized nanoparticle filling the antibody coated nanohole arrays enables digital, ultra-sensitive and specific detection of the target biomarker. (C) Example of a plasmonic imaging of a spotted microarray.

Ref. Nr

6.1850

Keywords

Diagnostics, rapid, multiplexing, point-of-care, biomarkers, digital detection

Intellectual Property

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[WO2019/186416](#)

Publications

[Belushkin A. et al, ACS Nano \(2018\)](#)
[Belushkin A. et al, Small \(2020\)](#)

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Description

Nanoplasmonic devices enabling strong light-matter interaction have become a paradigm for high performance biomarker detection for applications ranging from biological and pharmaceutical research to medical diagnostics and global healthcare. Here, we propose a nanoparticle-enhanced imaging-based plasmonic biosensing technique using gold nanohole arrays that enables highly sensitive protein biomarker detection with single analyte resolution. Two antibodies different from each other but specific for the biomarker are used. The capture antibody is linked to the gold nanohole array and the detection antibody to gold nanoparticle binds. They interact with the biomarker forming an antibody-biomarker-antibody-nanoparticle complex, which fills the nanohole. The transmission from each nanohole with the full complex is strongly suppressed. The principle is used for digital quantification and localization of the single nanoparticle labelled biomarkers over large areas by using a low-cost and portable optical reader.

The plasmonic nanohole array is configured in a microarray format by spotting different capture antibodies for multiplexed detection of different biomarkers simultaneously from a single sample.

Advantages

- Detect biomarkers and analytes with a very low detection threshold, in the range of picograms per milliliter with minimal sample volume (<10 uL).
- Rapid, low cost, easy to use, portable and suited for multiplexing analysis.
- Appropriate for a large variety of indications incl. acute & chronic diseases.

Applications

- Diagnostics applications
- Highly sensitive multiplexing biomarker detection for acute indications and rapid detection time
- Point of care applications