PLASMONIC NANOPARTICLES IN MICROSTRUCTURED FIBRES AS DETECTION PLATFORMS

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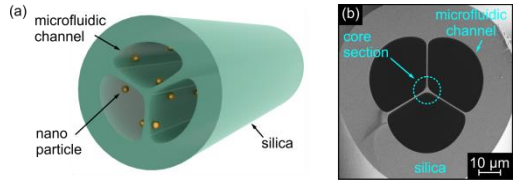

Figure 1: (a) Schematic of the plasmonic suspended-core fibre. (b) Scanning-electron micrograph of the fibre[1].

Rapid, small-volume detection of specific target molecules is of great importance for bioanalytics and efficient disease diagnostics. One promising sensing strategy involves the combination of plasmonically-active waveguides and microfluidics. Here, microstructured optical fibres containing plasmonic nanoparticles immobilised along a suspended-core are introduced for efficient refractive index sensing. Extremely small optical core sizes and large adjacent microfluidic channels, allow over two orders of magnitude of nanoparticle densities to be realised over millimetre sample lengths. Refractive index sensitivities of 200 nm/RIU for analytes have been accessed by tailored ensemble lengths of immobilised gold nanospheres. Our concept represents an entirely integrated optofluidic sensing platform for small-volume detection – allowing real-time analyte monitoring and multiplexing, both of major relevance for molecular disease diagnostics and environmental science.

REFERENCES:

1. B. Doherty et al. Nanoparticle functionalised small-core suspended-core fibre – a novel platform for efficient sensing. *Biomedical optics express* **8**, 790 (2017).