An innovative Fiber Optic- Surface Plasmon Resonance (FO-SPR) biosensor as a potential tool for SARS-COV-2 detection

Iulia ANTOHE
Izabela JINGA and Gabriel SOCOL
National Institute for Lasers, Plasma and Radiation Physics, 409 Atomiștilor Street, 077125 Bucharest - Măgurele, Romania
iulia.antohe@inflpr.ro
gabriel.socol@inflpr.ro

Fiber Optic – Surface Plasmon Resonance (FO-SPR) technology has been recognized as a remarkable optical sensing tool in various fields of life science, agro-food sector and medical diagnostics, as it can provide efficient characterization and real-time quantification of various biological entities [1]. Potential applications can span from studying interactions between proteins, lipids, nucleic acids, to even low molecular weight molecules such as drugs [2-4]. Moreover, these systems possess some other interesting features such as acceptable costs, compact instrumentation, immunity to electromagnetic interferences and remote sensing capabilities [5]. In the FO-SPR technology (see Figure 1), the light is guided through a metal-coated multimode FO to yield propagating plasmonic waves at the interface obtained with the analysing environment. Sensitive changes in the refractive index of light are then triggered by any biological interaction occurring at this interface, and subsequently processed into a graphical representation [6]. The developed FO-SPR sensor can be applied in an automated setup for both immuno- and aptamer based bioassays, rivalling with the ELISA and PCR golden standards [3,4].

Hence, in the near future we are attempting to employ the FO-SPR system to efficiently detect the SARS-COV-2 antigen, using both antibodies and aptamers as specific bioreceptors. In this scenario, it is expected that FO-SPR sensing performance competes with the state-of-the-art technologies in terms of faster detection (less than 60 min) and higher sensitivity.

REFERENCES

[1] Arghir I., Delport F., Spasic D., Lammertyn J.; New Biotechnology, 32 (5), 2015, 473-484.
[2] Antohe (Arghir) I., Schouteden K., Goos P., Delport F., Spasic D., Lammertyn J.; Sensors and Actuators B, 229, 2016, 678-685.
[3] Delport F., Pollet J., Janssen K., Verbruggen B., Knez K., Spasic D., Lammertyn J.; Nanotechnology, 23 (6), 2012, 065503-065510.
[4] Lu J., Spasic D., Delport F., Van Stappen T., Detrez I., Daems D., Vermeire S., Gils A., Lammertyn J; Analytical Chemistry, 89 (6), 2017, 3664-3671.
[5] Wang X., Wolfbeis O.S.; Analytical Chemistry 88, 2016, 203-227.
[6] Arghir I., Spasic D., Verlinden E., Delport F., Lammertyn J.; Sensors and Actuators B, 216, 2015, 518-526.

FIGURES

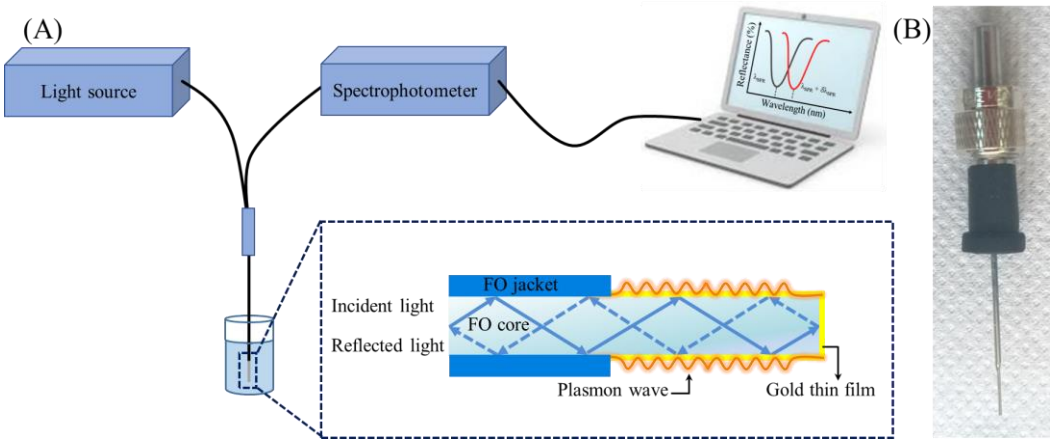

Figure 1: Fiber optic-surface plasmon resonance (FO-SPR) sensing platform. (A) Schematic of the experimental setup; (B) Image of the fabricated FO-SPR sensor.