

Localized Surface Plasmon Resonance Fiber Optic Nanoprobe

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Introduction

Fiber optic technology transmits information as light impulses along a plastic fiber. Localized Surface Plasmon Resonance (LSPR) is the arrangement of nanoparticles which are well suited for surface binding. LSPR coupled with fiber optic nanoprobe is used as a biosensor. The experiment performed uses this technology for DNA detection and hybridization.

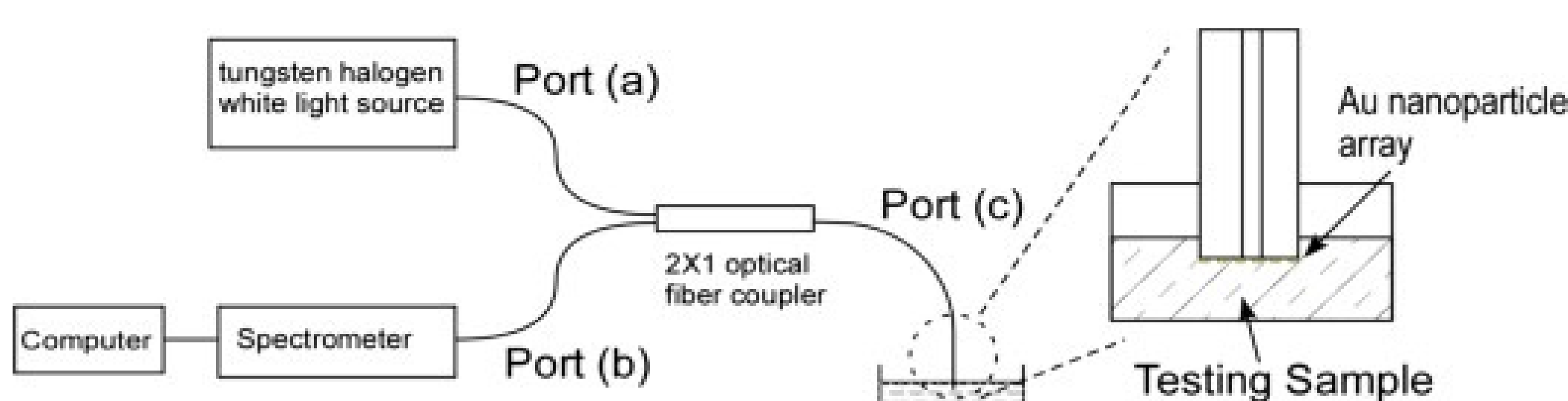


Figure 1:

A coupler is used to transmit the data from the fiber tip through the spectrometer to the computer.

Results

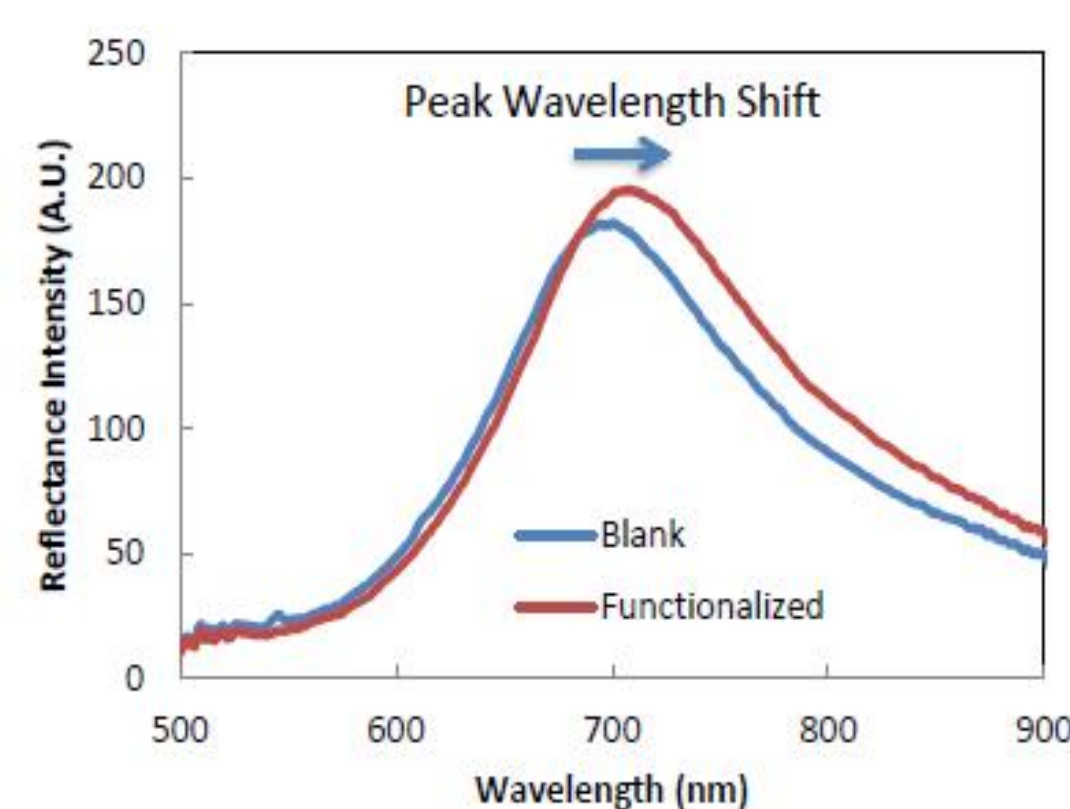


Figure 2:

After the LSPR fiber optic tip is functionalized, it shifts to the right of the baseline.

Figure 3:

This figure shows the shift of the ARC probe and each of the 12 dilutions of ARC Target. The average shift was roughly 26.6 nm after 1 μ M of the target.

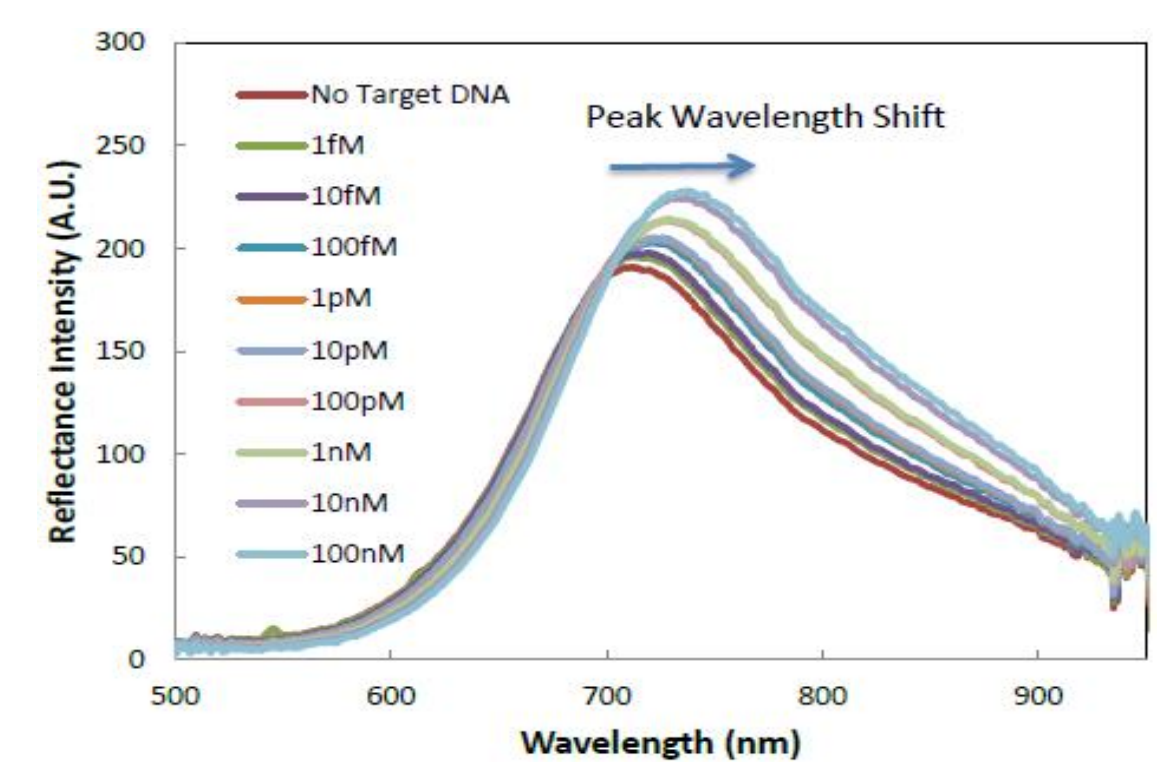
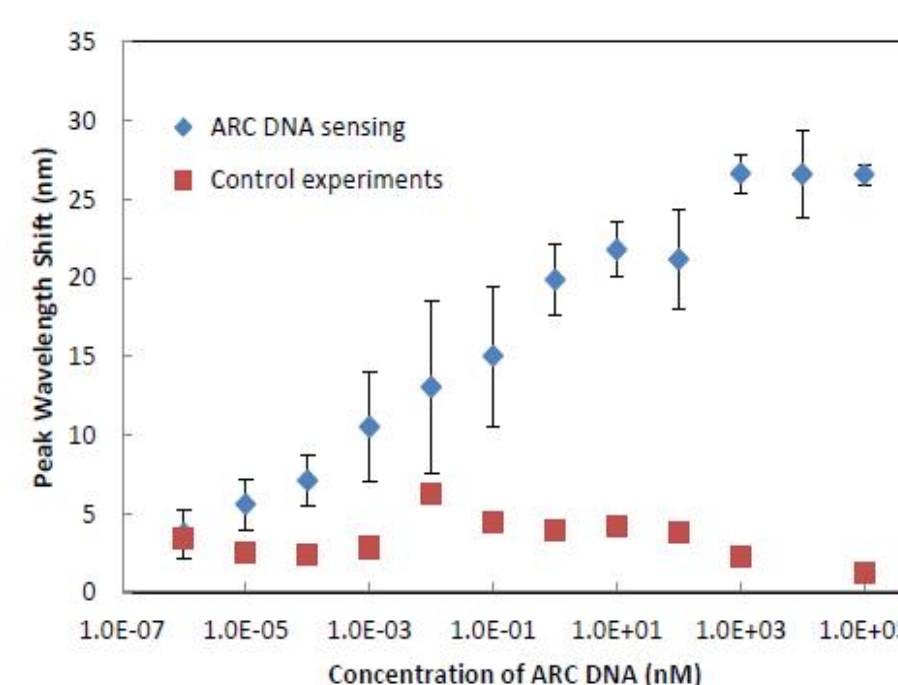


Figure 4:

The wavelength vs. concentration can be seen here for both the ARC DNA and control experiments.



Materials and Methods

First the fiber tip has to be probed with ARC DNA probe. The ARC DNA probe is diluted to 100 microMolar concentration with deionized water. Then the fiber tip is incubated in the probe for 24 hours. Next, the tip was rinsed three times with water and the wavelength was saved.

The next step is to bind the target. The target is ARC DNA target and is diluted to 100 μ M concentration with deionized water. Then a serial dilution is used to make 12 different concentrations ranging from 100 μ M to 1fM. The solution used to dilute the ARC Target is SSPE buffer. The tip is placed in the lowest concentration which is the 1fM for 10 minutes, then rinsed with water for three times. A wavelength is recorded. Next the tip is placed in the next smallest concentration for 10 minutes, and the process is continued for all 12 concentrations. The control experiment is done the same way but instead of using a ARC DNA probe and target, a NEG DNA probe and target are used.

Conclusions

This research is being done to determine if a LSPR fiber optics nanoprobe is able to detect ssDNA. This information can be useful for other experiments that would need to detect DNA.

References

- Sanders, M., Lin, Y., Wei, J., Bono, T., & Lindquist, R. G. (2014). An enhanced LSPR fiber-optic nanoprobe for ultrasensitive detection of protein biomarkers. *Biosensors And Bioelectronics*, 6195-101. doi:10.1016/j.bios.2014.05.009

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