Supplemental Information

Label-Free Detection of DNA Hybridization with A Compact LSPR-based Fiber-Optic Sensor

Savannah Kaye,[a#] Zheng Zeng,[b#] Mollye Sanders[a], Krishnan Chittur,[cd] Paula M Koelle,[d] Robert Lindquist,[a] Upender Manne,[e] Yongbin Lin,[a,*] Jianjun Wei,[b*]

[a] Center for Applied Optics, University of Alabama at Huntsville, Huntsville, AL 35899, USA.

[b] Department of Nanoscience, Joint School of Nanoscience and Nanoengineering, University of North Carolina at Greensboro, Greensboro, NC 27401, USA.

[c] Chemical and Materials Engineering, University of Alabama Huntsville, Huntsville, AL 35899, USA

[d] Genecapture, 601 Genome Way, Huntsville, AL 35806, USA

[e] Department of Pathology, University of Alabama at Birmingham, AL 35249

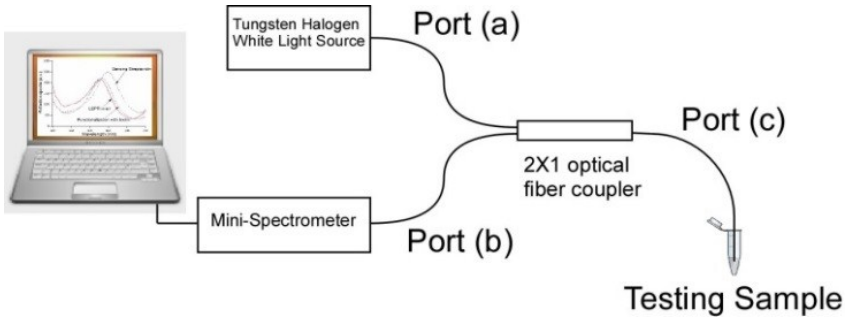

Fig. S1. A schematic illustration of the LSPR-FO meas-urement setup based on backward scattering mode.Figure 3. (a) Measured reflection spectra for the LSPR-FO probe in various solvents. (b) Linear fit of the LSPR peak wavelengths (left axis) and LSPR peak intensity (right axis) with the index of refraction of the solvents.

To test the stability and reusability of the nanoprobe for detection, we measured the LSPR reflection spectra of a nanoprobe before and after the DNA functionalization and DNA detection. The probe is cleaned with a "piranha" solution (a mixture of 30% H_2O_2 and 98% H_2SO_4 in a 1:3 volume ratio) for a few minutes and rinsed with DI water, then dried in a clean hood.

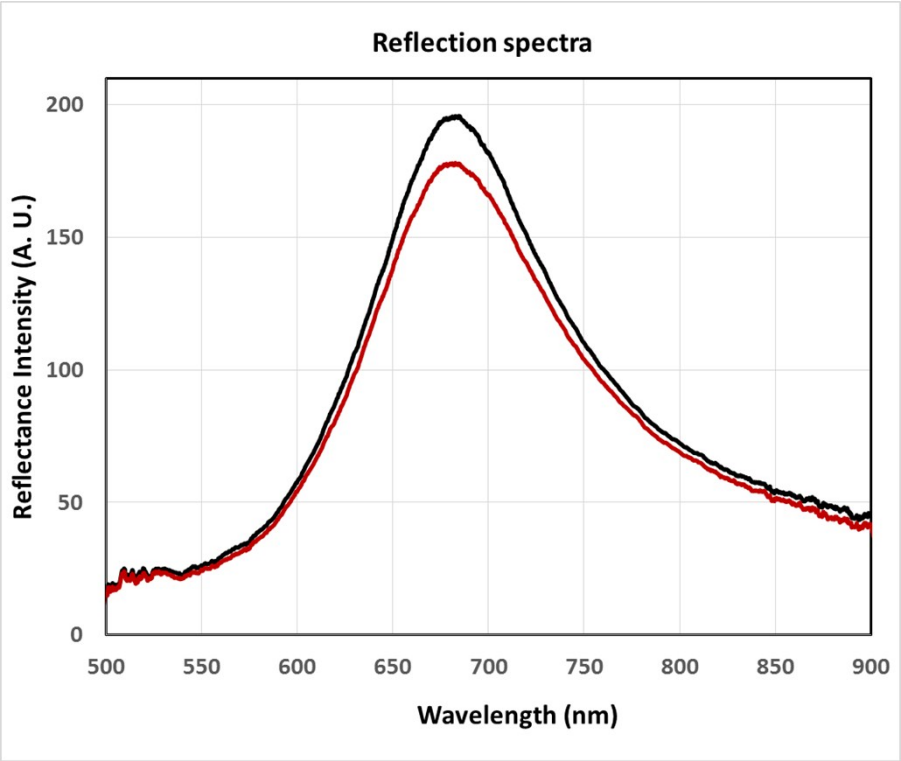

Fig. S2. Representative spectra of a nanoprobe in air before (black) and after (red) using for DNA detection testing. The probe was cleaned with a "piranha" solution and DI water, and dried in a clean hood. The red curve was obtained five days later than the black curve. The intensity of the peak is different, however, the peak position is almost the same, indicating insignificant changes of the LSPR coupling.

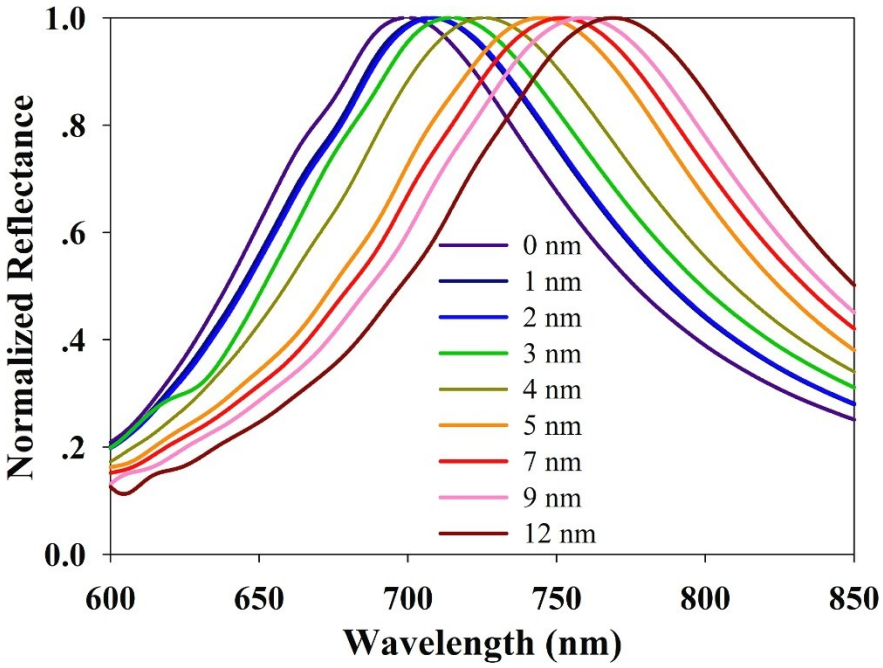

Fig. S3. The FDTD simulated reflectance spectra in various thicknesses of the DNA layer, where the spectra are normalized.

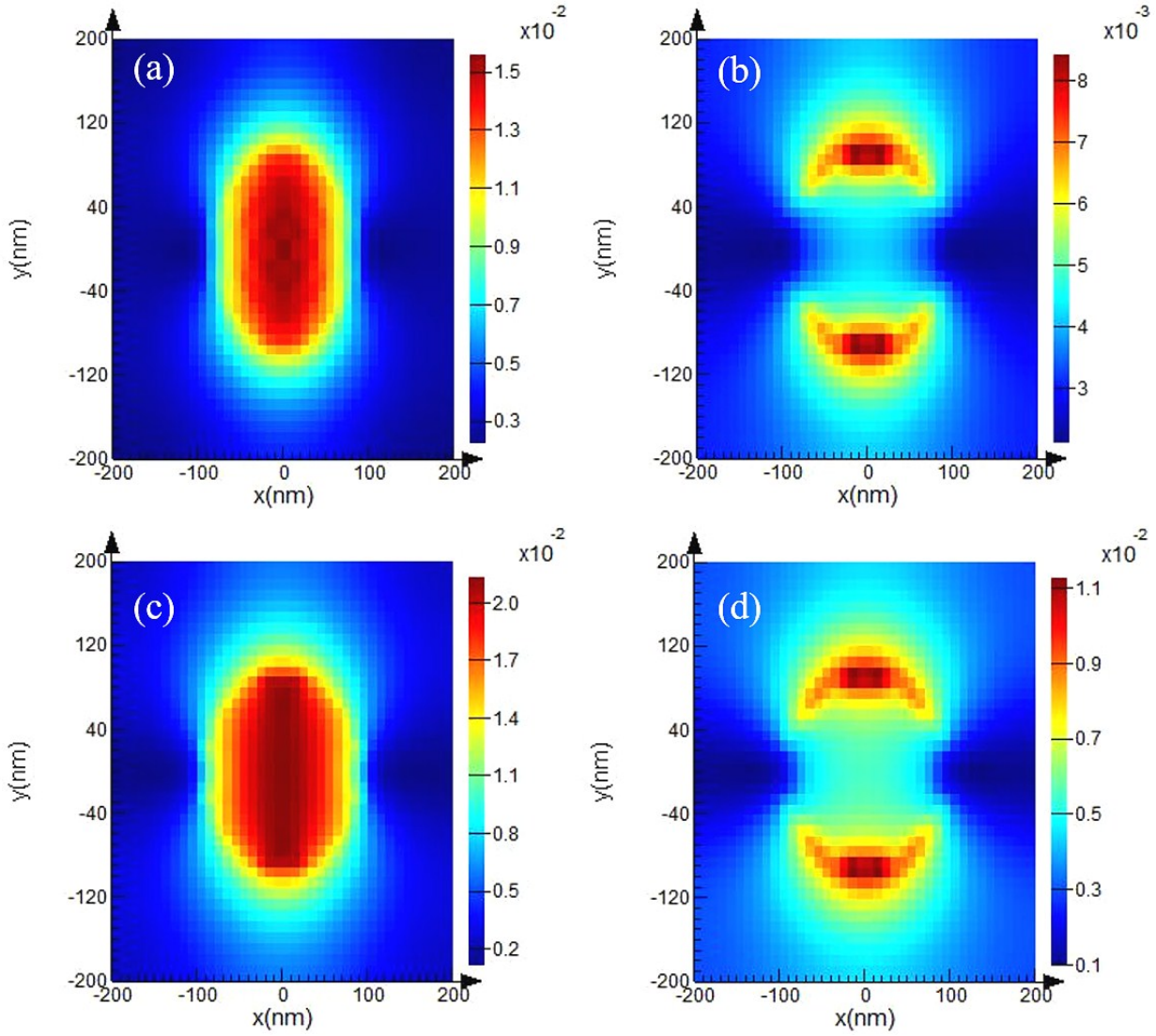

Fig. S4. FDTD calculated magnetic filed distribution (near field) on the reflected and transmitted side: (a) reflected surface of 0 nm DNA/Au nanodot; (b) transmitted surface of 0 nm DNA/Au nanodot; (c) reflected surface of 4 nm DNA/Au nanodot; (d) transmitted surface of 4 nm DNA/Au nanodot.