Electronic Supplementary Information File For

A Novel Liquid Biopsy-Based Approach for Highly Specific Cancer Diagnostics: Mitigating False Responses in Assaying Patient Plasma-Derived Circulating microRNAs through Combined SERS and Plasmon-Enhanced Fluorescence Analyses

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Table S1: -ssDNA (oligomer) sequences used for this study.

Name	Sequence	Modification
-ssDNA-10b	5’ CAC AAA TTC GGT TCT ACA GGG TA 3’	3’ Thiol-$(CH_2)_3$
-ssDNA-96	5’ AGC AAA AAT GTG CTA GTG CCA AA 3’	3’ Thiol-$(CH_2)_3$

Table S2: microRNA sequences used for this study.

Name	Sequence	Modification
microRNA-10b	5’ UACCCUGUAGAACCGAAUUUGUG 3’	N/A
microRNA-96	5’ UUUGGCACUAGCACAUUUUUGUG 3’	N/A
microRNA-145	5’ GUCCAGUUUUCCCAGGAAUCCCU 3'	N/A
microRNA-143	5’GGUGCAGUGCUGCAUCUCUGGU 3’	N/A
microRNA-490-5p	5’ CCAUGGAUCUCCAGGUGGGU 3’	N/A
microRNA-10b-FAM	5’ UACCCUGUAGAACCGAAUUUGUG 3’	5’ 6-FAM
microRNA-96-FAM	5’ UUUGGCACUAGCACAUUUUUGUG 3’	3’ 6-FAM

Table S3: microRNA-10b calibration curve raw data.

microRNA-10b Concentration (nM)	1255 cm^{-1} Peak Intensity (cm^{-1})	Standard Deviation (cm^{-1})
100	440.5	32.0
10	409.3	35.0
1	344.7	40.0
0.1	313.9	33.5
0.01	284.6	23.5
0.001	277.2	30.0
0.0001	206.1	27.5

Table S4: microRNA-96 calibration curve raw data.

microRNA-96 Concentration (nM)	1255 cm^{-1} Peak Intensity (cm^{-1})	Standard Deviation (cm^{-1})
100	497.7	50.0
10	428.3	35.0
1	397.1	22.9
0.1	362.7	30.0
0.01	346.1	27.5
0.001	329.4	17.3
0.0001	257.4	40.0

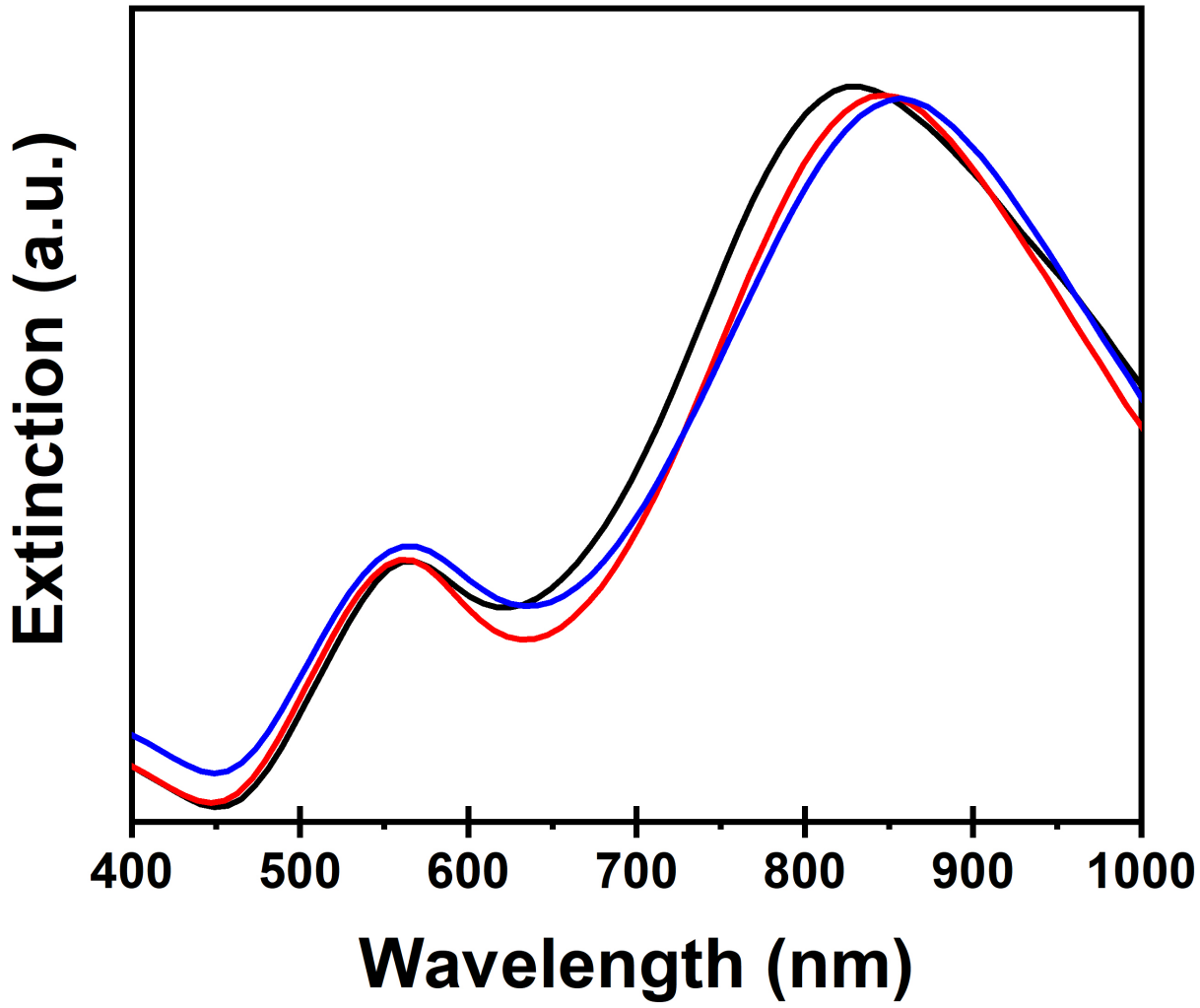

Fig. S1. UV-Vis extinction spectra of Au TNPs during the different stages of surface functionalization. ***Black curve:*** *Extinction spectrum of as synthesized Au TNPs attached onto a silanized glass substrate. The LSPR dipole peak position (λ_{LSPR}) of Au TNPs is ~830 nm.* ***Red curve:*** *Functionalization of TNPs with -S(CH_2)$_3$-ssDNA-10b/96-FAM, λ_{LSPR} = ~845 nm. Red shifting of the LSPR dipole peak is due to the change in the local refractive index around the nanoprisms upon attachment of -S(CH_2)$_3$-ssDNA-10b/96-FAM.* ***Blue curve:*** *Further functionalization of TNPs with 3-MP produces additional red shifts, λ_{LSPR} = ~860 nm. All spectra were collected in RNAs free water.*

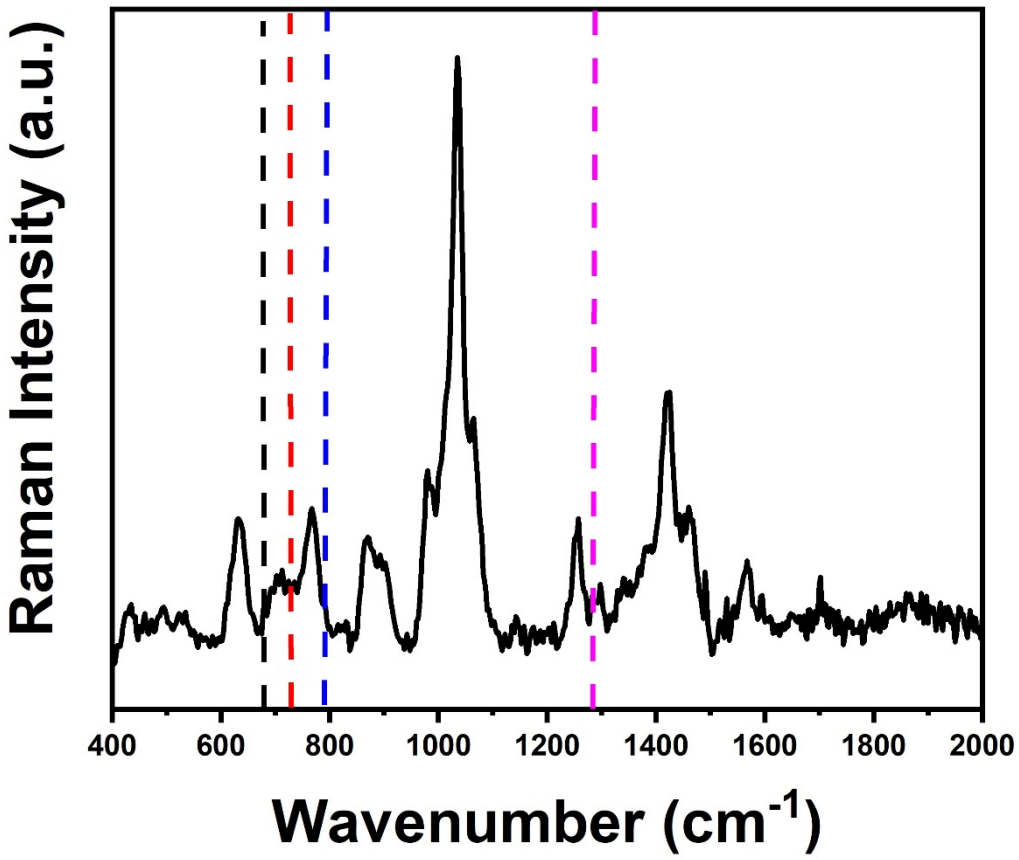

Fig. S2. SERS spectra of -ssDNA attached onto Au TNPs through the Au-S bond. *Guanine ring breathing is represented at 688 cm^{-1} (black dashed line). Adenine ring breathing is represented at 733 cm^{-1} (red dashed line). Cytosine ring breathing is represented at 790 cm^{-1} (blue dashed line). Phosphodiester group of the nucleic acids is represented at 1289 cm^{-1} (pink dashed line).*

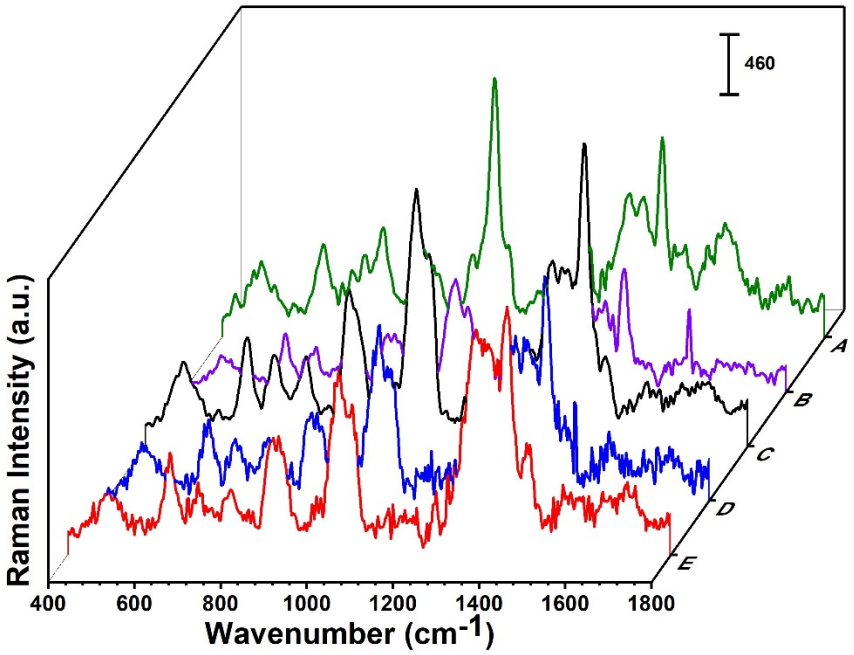

Fig. S3. SERS spectra of reversibility test. *(A) SERS spectra after attachment of -ssDNA-10b, (B)SERS spectra after attachment of 3-MP, (C) SERS spectra after attachment of microRNA-10b-FAM, (D) SERS spectra after treating with RNase H enzyme solution, and (E) SERS spectra after re-attachment of microRNA-10b-FAM.*

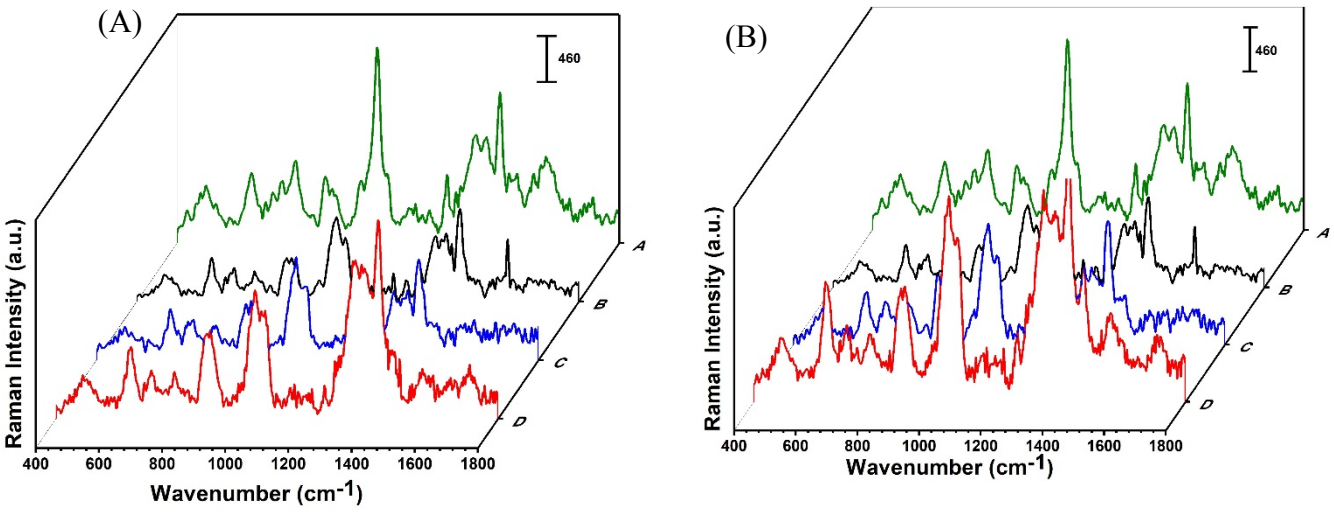

Fig. S4. SERS spectra of -ssDNA specificity tests. *(A) Representation of SERS spectra for -ssDNA- 10b specificity test. [A = -ssDNA-10b, B = 3-MP, C = mixture of microRNA-96, 145, 143, and 490-5p. D = microRNA-10b.] (B) Representation of SERS spectra for -ssDNA-96 specificity test. [A = -ssDNA-96, B = 3-MP, C = mixture of microRNA-10b, 145, 143, and 490-5p. D = microRNA-96.]*