Alkyne- and Nitrile-Anchored Gold Nanoparticles for Multiplex SERS Imaging of Biomarkers in Cancer Cells and Tissues

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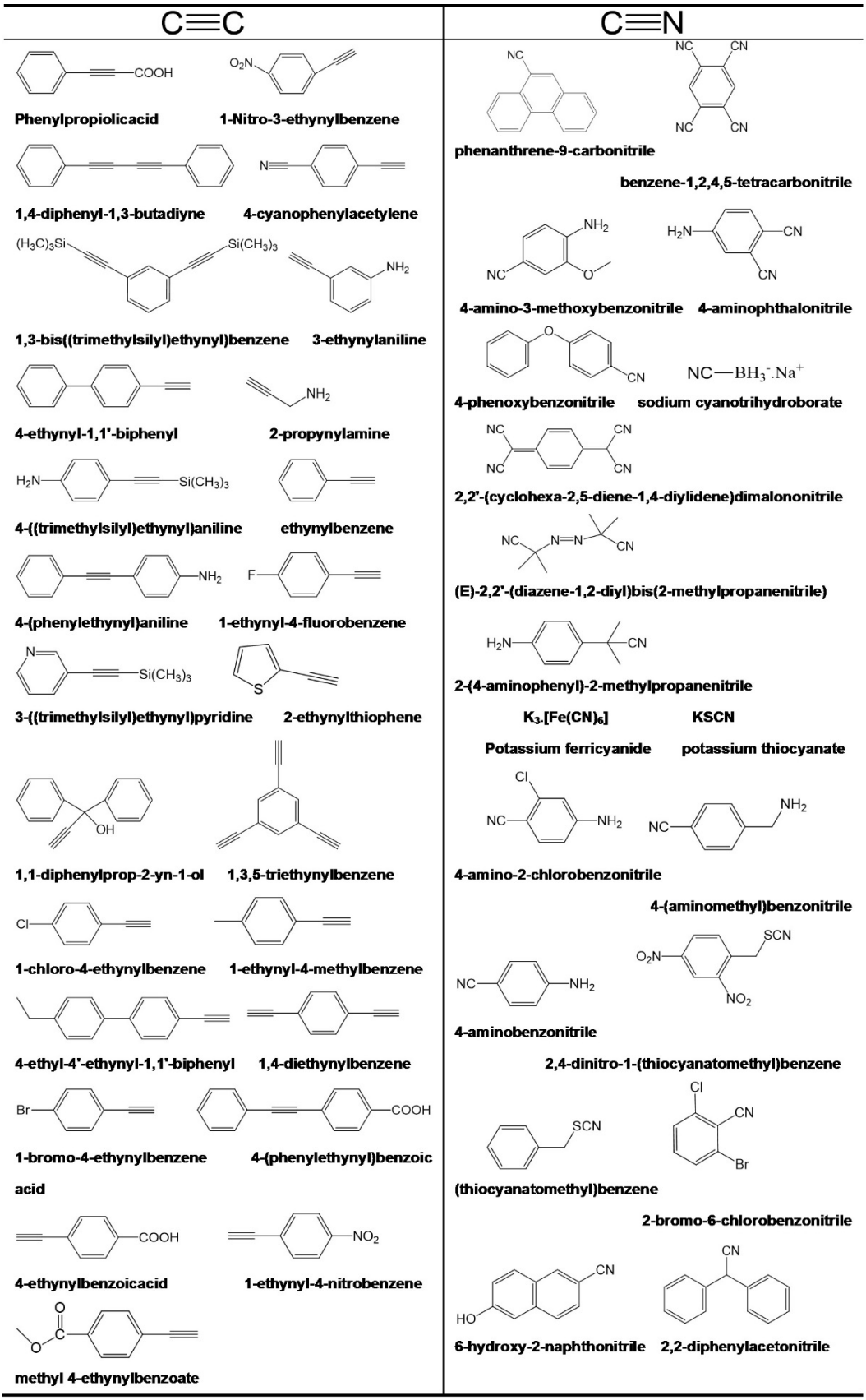

Figure S1. The molecular structures of 44 Raman dyes for SERS tags.

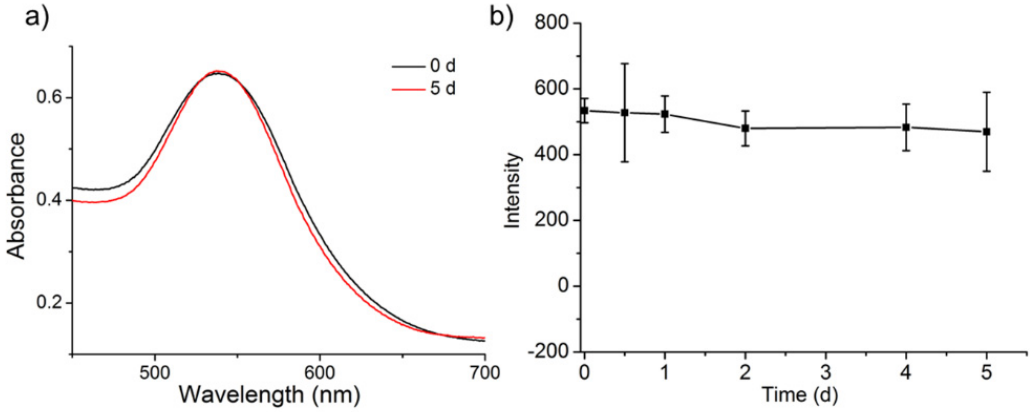

Figure S2. Stability test of SERS tags using 4-ethynyl-biphenyl as Raman reporters. (a) UV-Vis spectra of SERS tags prepared freshly (blank line) and that stored for 5 day (red line). (b) Signal intensity change of the SERS tags in five days successively.

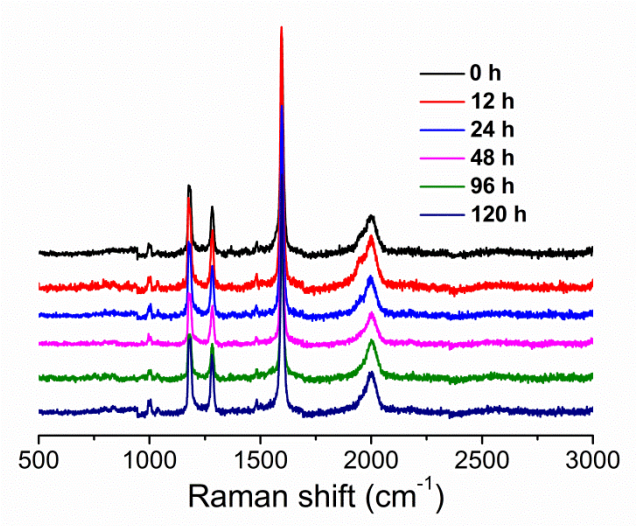

Figure S3. SERS spectra of the as-prepared tags at different times. 4-ethynyl-biphenyl was used as the Raman reporters.

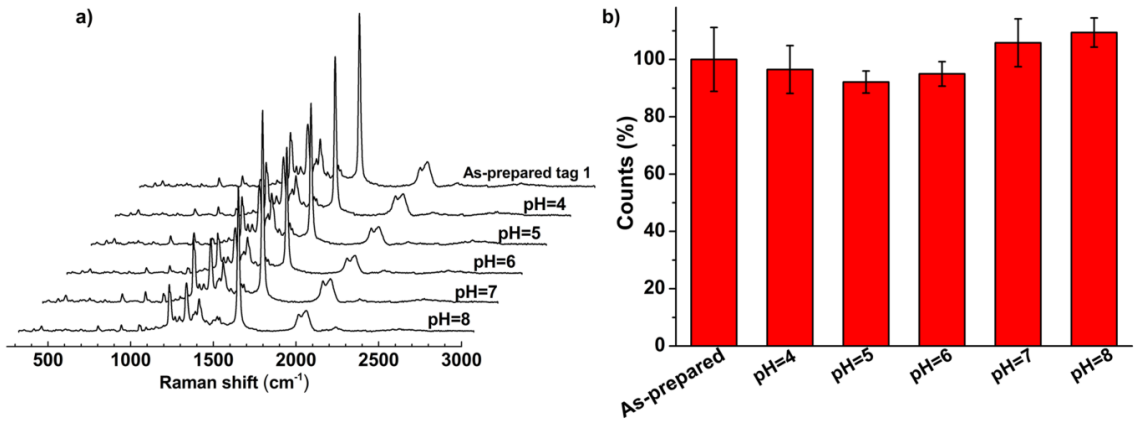

Figure S4. The signal stability test of SERS tags in solutions with different pH values from 4-8. (a) Spectra and (b) Relative intensities of SERS tags in the solutions after storing for 12 h.

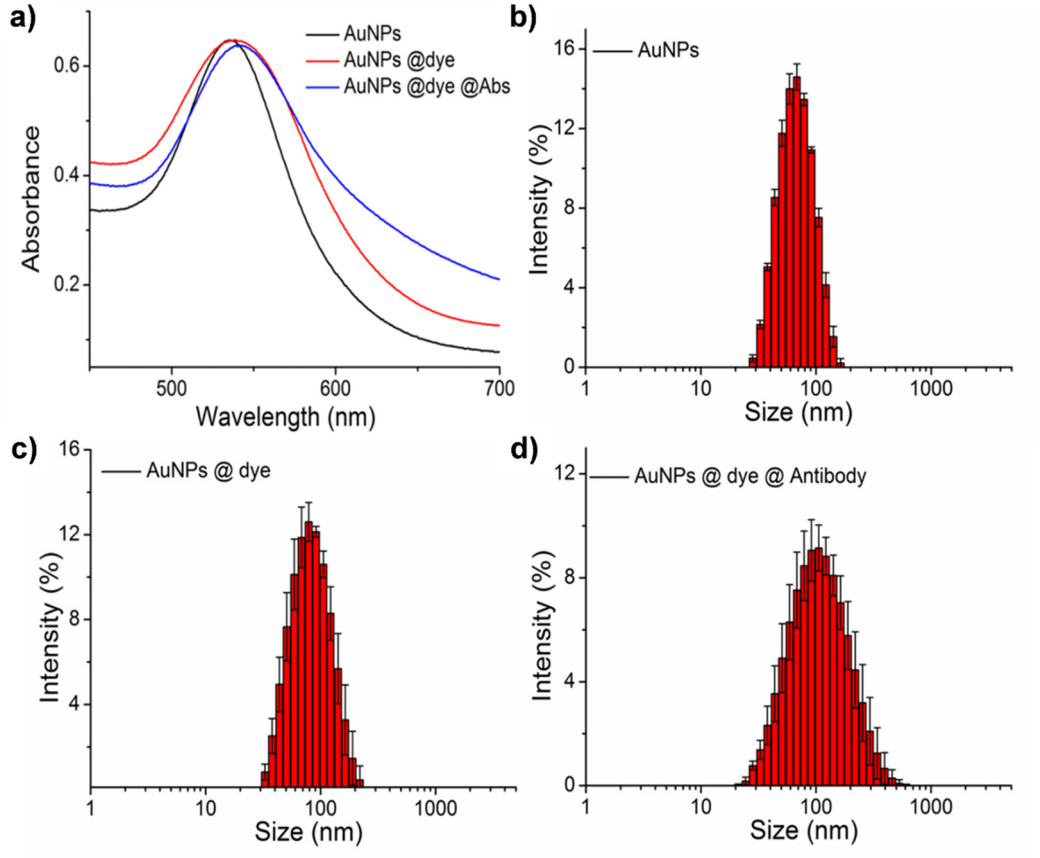

Figure S5. (a) UV-vis spectra of AuNPs (blank line), AuNPs @dye (red line), and AuNPs @dye @Abs (blue line). A certain degree of red-shift can be detected after modification. (b-d) DLS characterization of AuNPs, AuNPs @dye, and AuNPs @dye @Abs. The error bars represent the standard deviations of three parallel samples.

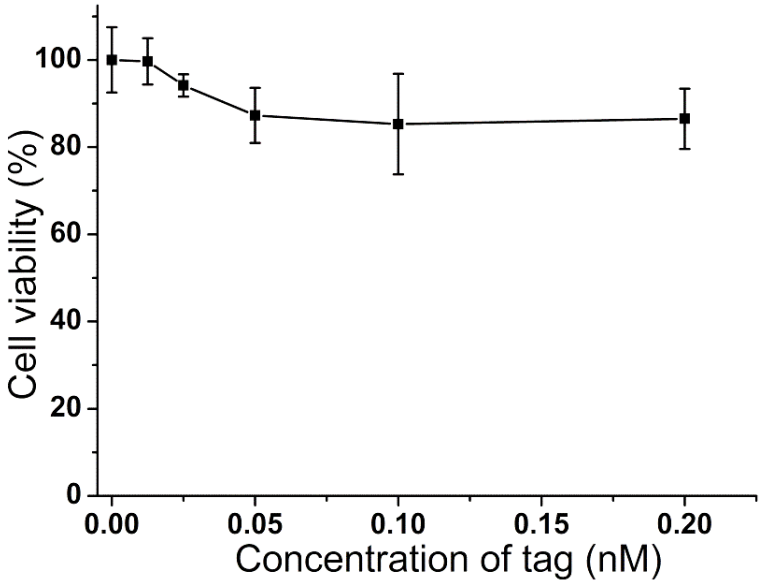

Figure S6. Cytotoxicity assessment of the SERS tags. MTT assay was applied to assess the cytotoxicity of different concentrations of the tag 1 toward MCF-7 cells. The error bars represent the standard deviations of three parallel samples.

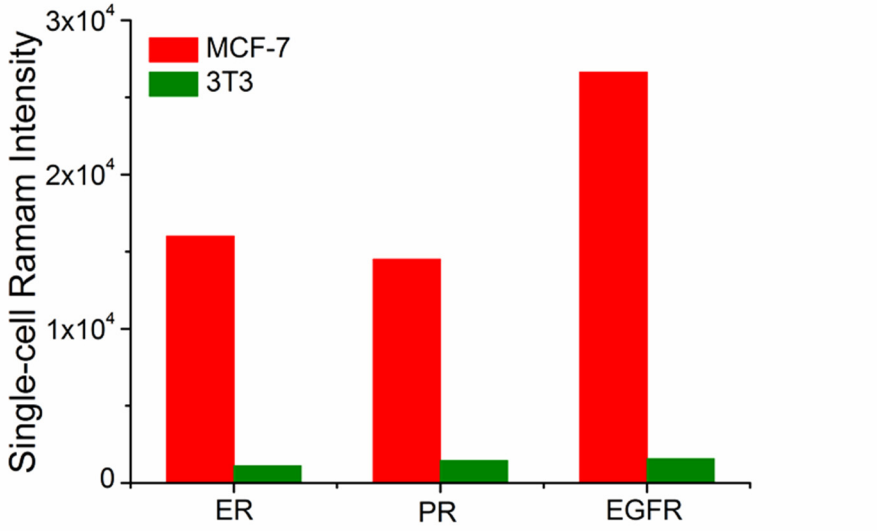

Figure S7. Statistics of the signals for ER, EGFR and PR in each 3T3 or MCF-7 cell.

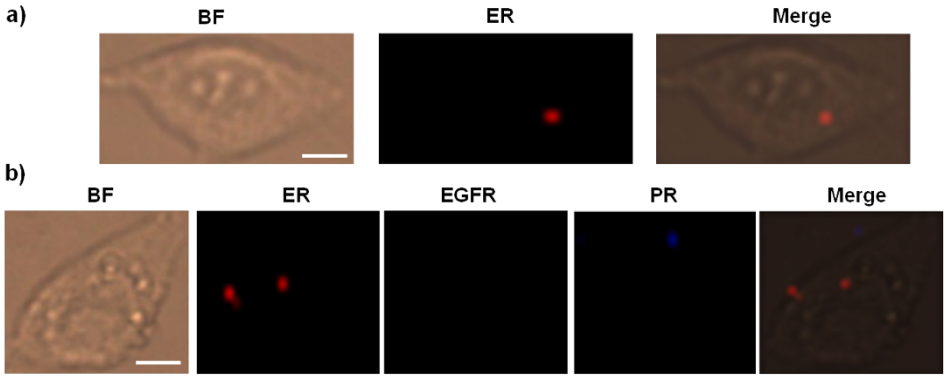

Figure S8. (a) Background-free Raman imaging of ER in MCF-7 cell line which was incubated with 0.033 nM of tag 1 without conjugation with antibodies against ER. (b) Multiplexed background-free imaging of ER, EGFR and PR in MCF-7 cell line which was incubated with the same concentration (0.033 nM) of tag 1, tag 2, and tag 3 without conjugation with antibodies against ER, EGFR, and PR respectively. Scale bar: 5 μm. The Raman signals in the red, green, and blue channels correspond to the tag 1, tag 2, and tag 3 respectively. The SERS images were obtained by 633 laser power (30 mW), 100× objective lens, with an integration time of 1 s and a step size of 1 μm in StreamLine high-speed acquisition mode.

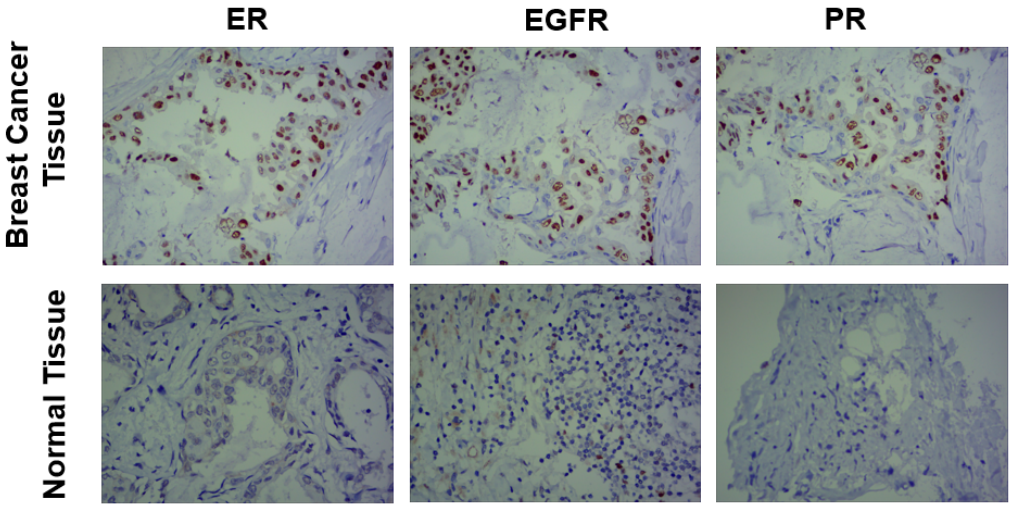

Figure S9. Expression of ER, EGFR and PR measured by IHC in the breast cancer tissue and normal tissue. (Brown: stained biomarkers; purple: nucleus).

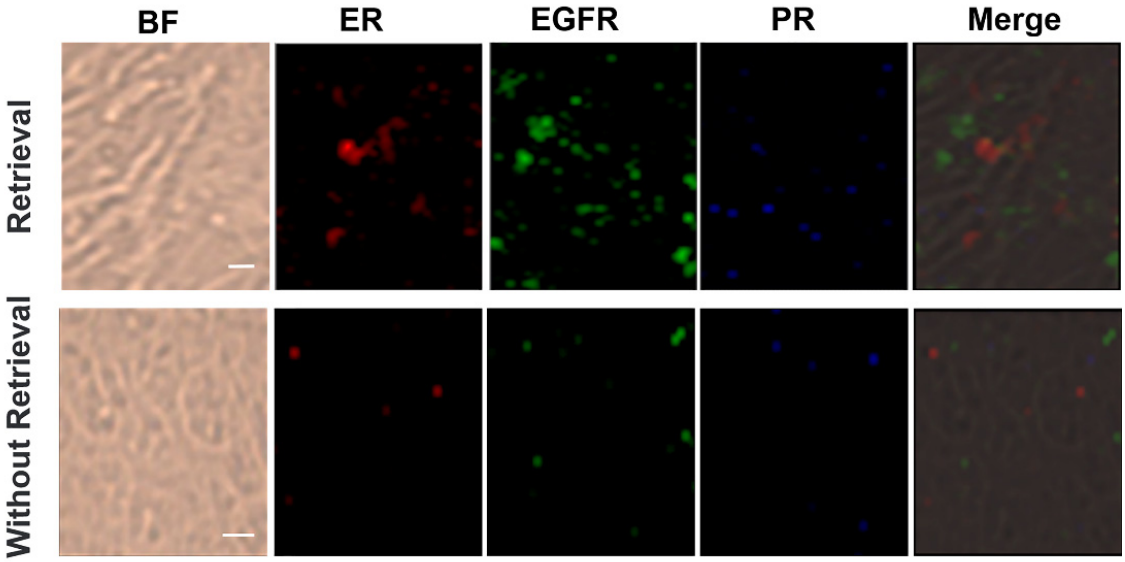

Figure S10. Multiplexed molecular profiling of breast cancer tissue sections with or without the treatment of antigen retrieval. Scale bar: 5 μm.