Supporting Information

Surface-enhanced Raman spectroscopy with single cell manipulation by microfluidic dielectrophoresis

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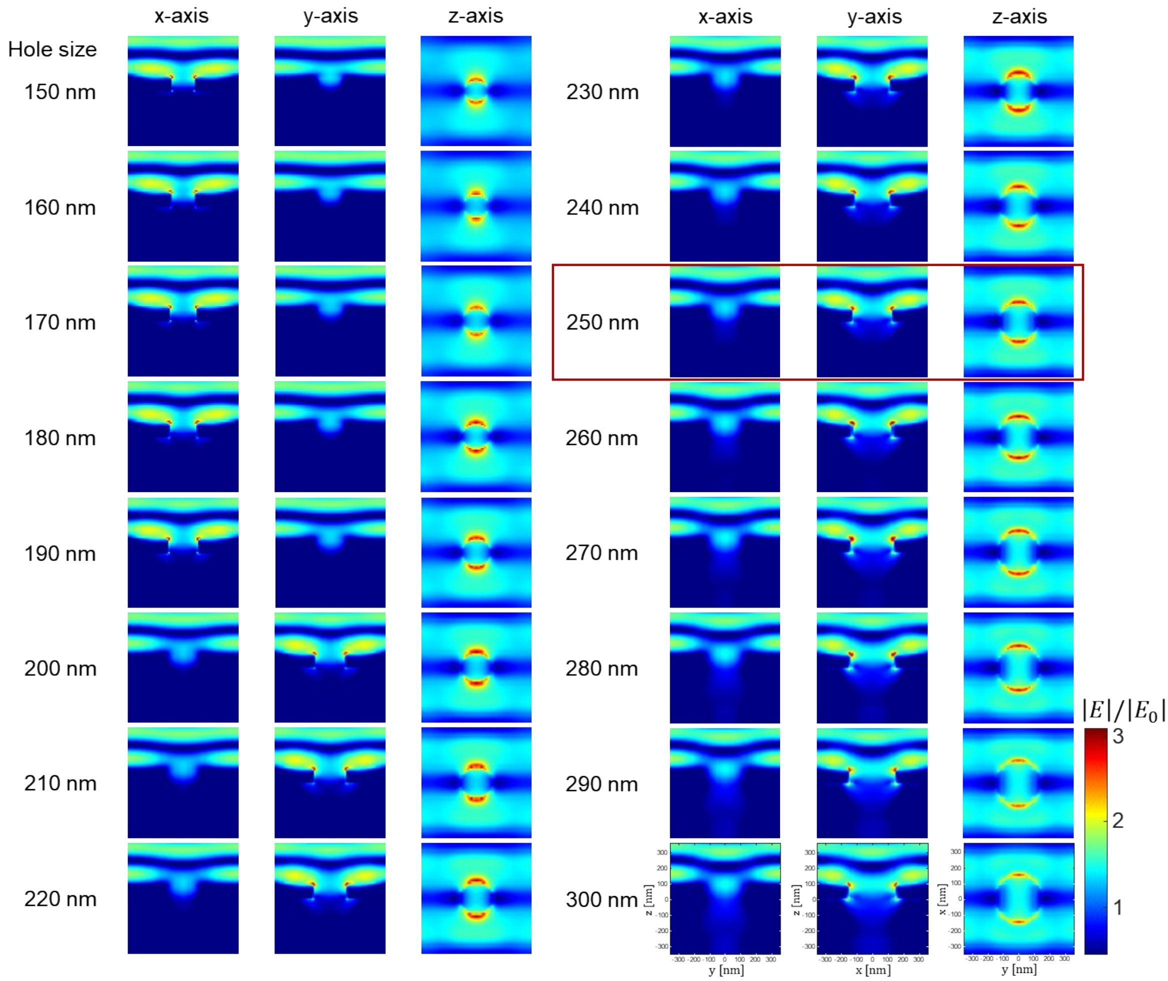
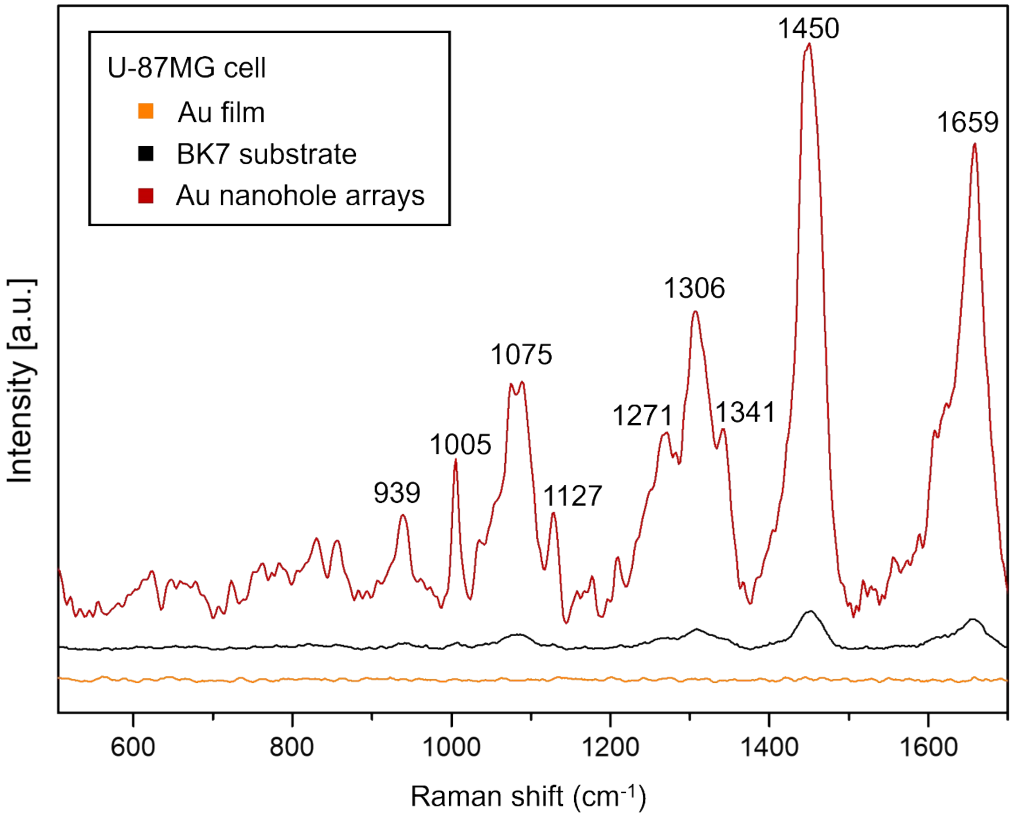
Supporting Information S1. The near-field distributions are shown below, as the nanohole diameter changes from ϕ = 150 to 300 nm. Other parameters remain identical, i.e., hole thickness = 100 nm and period = 700 nm. The red box represents the main parameter set used for the experiment.



The results confirm increased localization as the nanohole diameter ϕ decreases, which is especially clear in the *xy*-plane (*z*-axis). The peak electric field amplitude does not exhibit a significant or monotonic change.

Supporting Information S2. We provide control data by measuring Raman signals of U-87MG cell on gold film, BK7 glass substrate (thickness; 100 nm), and gold nanohole arrays (nanohole diameter: 250 nm and thickness: 100 nm), as shown below. Comparison of Raman signals measured on gold nanohole arrays and BK7 glass substrate confirms the surface-enhanced field enhancement. At 1450 cm^{-1}, SNR was measured to be 24.0 dB on gold nanohole arrays vs. 15.9 dB on BK7 when evaluated by first standard deviation. In other words, we can associate an enhancement by 8.1 dB with SERS due to the nanohole arrays. We expect that the degree of enhancement can be improved by optimizing geometrical parameters of nanohole arrays, e.g., using a smaller diameter. The nature of transmission-based measurement does not allow Raman signals to be acquired on gold film without nanohole arrays.


U-87MG cell
Au film
BK7 substrate
Au nanohole arrays
1450
1659
1306
1075
1271
1341
1005
939
1127
Intensity [a.u.]
600
800
1000
1200
1400
1600
Raman shift (cm-1)