Supporting Information

Bioinspired disordered flexible metasurfaces for human tear analysis using broadband surface-enhanced Raman scattering

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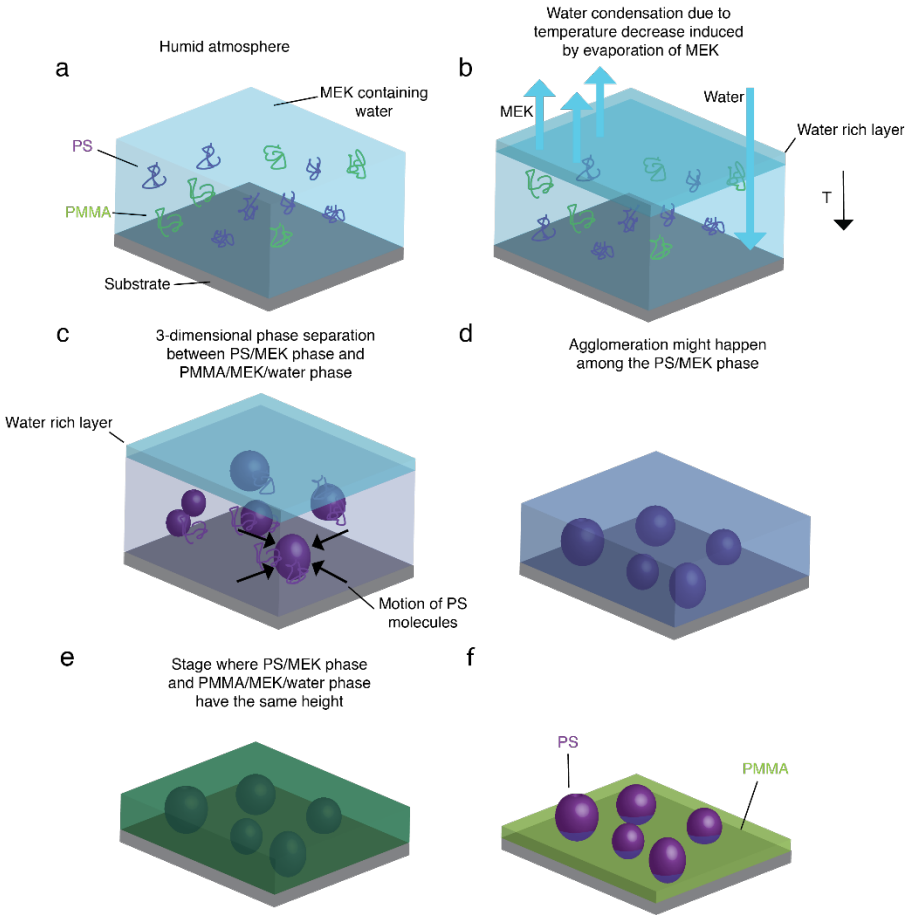

Figure S1. (a-f) Schematic of the different stages of the 3-dimensional phase separation process.[1]

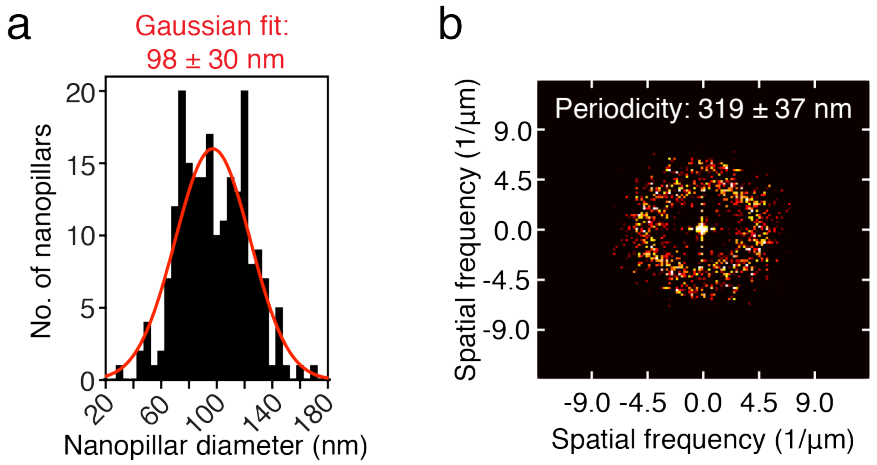

Figure S2. An ensemble with (a) diameter distribution of 98 ± 30 nm and (b) a short-range ordered periodicity of 319 ± 37 nm was simulated using FDTD.

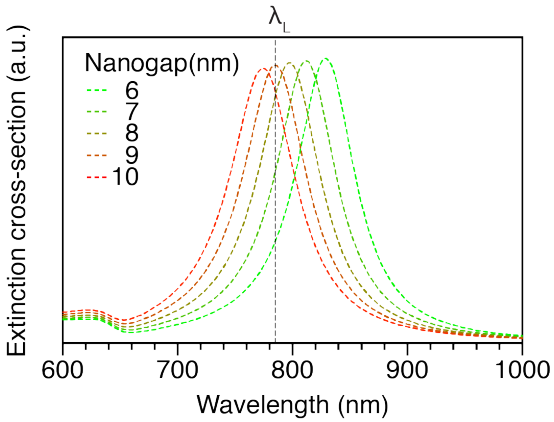

Figure S3. Extinction cross-section of a single MIM nanostructure as a function of nanogap size. A gap size of 9 nm is optimally tuned to match the laser wavelength.

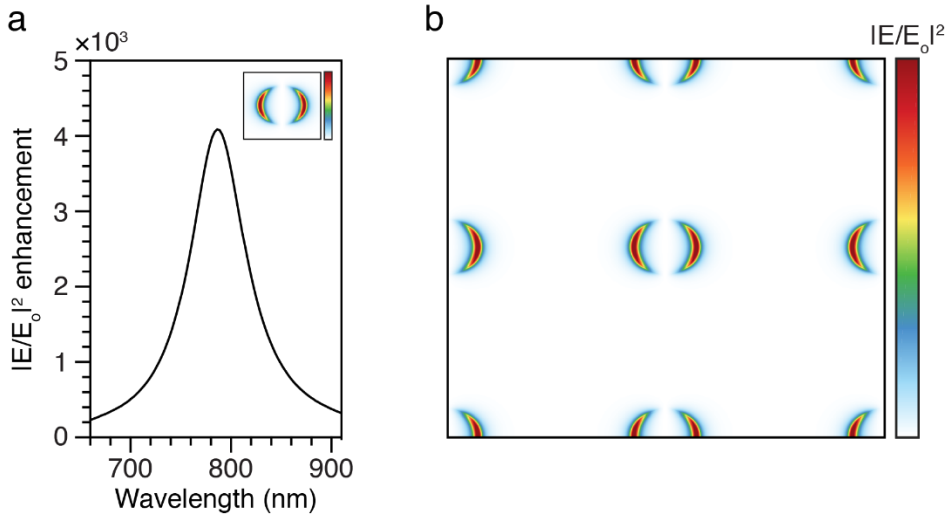

Figure S4. (a) The $|E/E_o|^2$ enhancement from a single MIM structure of diameter 100 nm and gap 9 nm. Inset shows the field profile of the single MIM structure. (b) The field-profile of a periodic distribution of MIM structures (diameter: 100 nm, gap: 9 nm, periodicity: 320 nm) showing no coupling between adjacent structures.

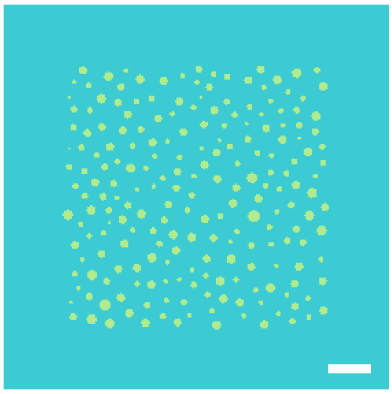

Figure S5. The 3.5 x 3.5 µm flex-MS ensemble simulated on FDTD. Scale bar: 600 nm.

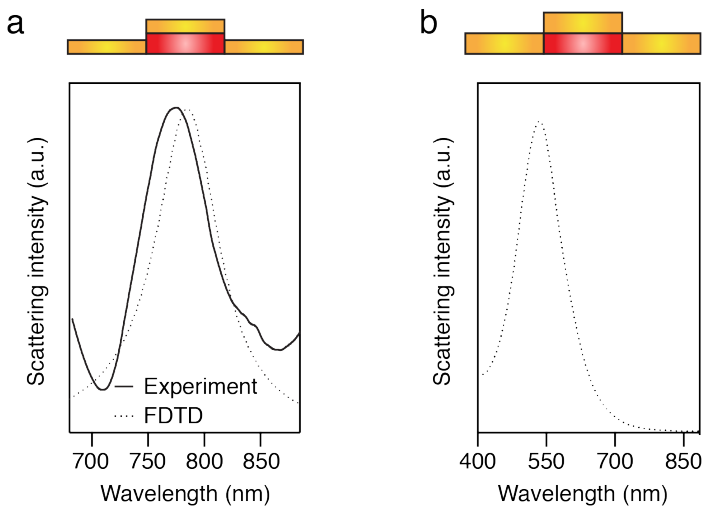

Figure S6. (a) MIM structures with an open 9 nm gap where the experimentally observed scattering cross-section is in agreement with that computed through FDTD. The scattering peak is tuned close to the laser excitation wavelength λ_L of 785 nm. (b) The same structures with a covered nanogap demonstrating a resonance in the visible regime.

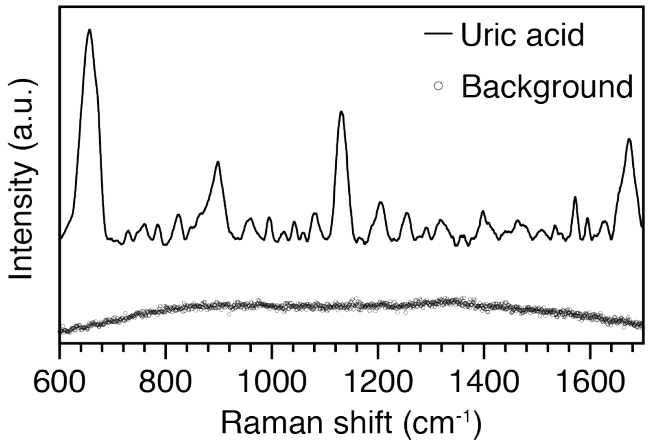

Figure S7. Effective suppression of background signal from the underlying polymer substrate by the flex-MS. In comparison, the SERS spectra of 150 µM uric acid on the flex-MS is shown.

References

(1) Huang, C. Phase Separation in Thin Polymer Films: From Self Stratification to Polymer Blend Lithography. Ph.D. Thesis, Technische Universität, Darmstadt, 2015.