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Supplementary Information

Soft Biomimetic Tapered Nanostructures for Large-Area Antireflective Surfaces and SERS Sensing

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Enhancement Factor (EF) Calculations: SERS and Raman spectra are collected from 150 nm nanostructured film and the bare film, respectively. Both of the surfaces were coated by 40 nm silver using thermal evaporator. A Raman module (WITEC alpha 300S) is used which has a 532 nm laser source.

EF defined as

$$\mathrm{EF} = \left(\frac{\mathrm{I}^{\mathrm{SERS}} / \mathrm{N}^{\mathrm{SERS}}}{\mathrm{I}^{\mathrm{Raman}} / \mathrm{I}^{\mathrm{Raman}}} \right)$$

I^{SERS} and I^{Raman} are the measured SERS and Raman intensities of the Rhodamin 6G (R6G) molecules on the surfaces. Both of the intensities are corrected based on the acquisition time (t) and power (P). Data collected over 5 s at 50 μW power for the nanostructured film and over 10 s at 40 mW power for the bare film, these acquisition times and laser powers are used to calculate corrected intensities.

Corrected Intensity defined as

$$\mathrm{I}_{\mathrm{Corr}} = \mathrm{I}^{\mathrm{Measured}} / (\mathrm{tP})$$

N^{SERS} and N^{Raman} refer the number of probed molecules on the substrates. Data collected within a 2 μm spot size. Also, 5 μl of 10^{-7} M and 2mM R6G solutions in ethanol were dropped on the nanostructured and bare film, respectively. Number of probed molecules is directly correlated with the dye concentration.

Table S1. Plasma etching conditions for fabricated paraboloid nanostructures. Pressures were kept constant for the three different situations and plasma durations were changed.

Steps	**Pressure (mTorr)**	**Duration (s)**		
		150 nm Nanostructures	200 nm Nanostructures	300 nm Nanostructures
1	25	7	8	11
2	20	8	9	12
3	5	7	8	11

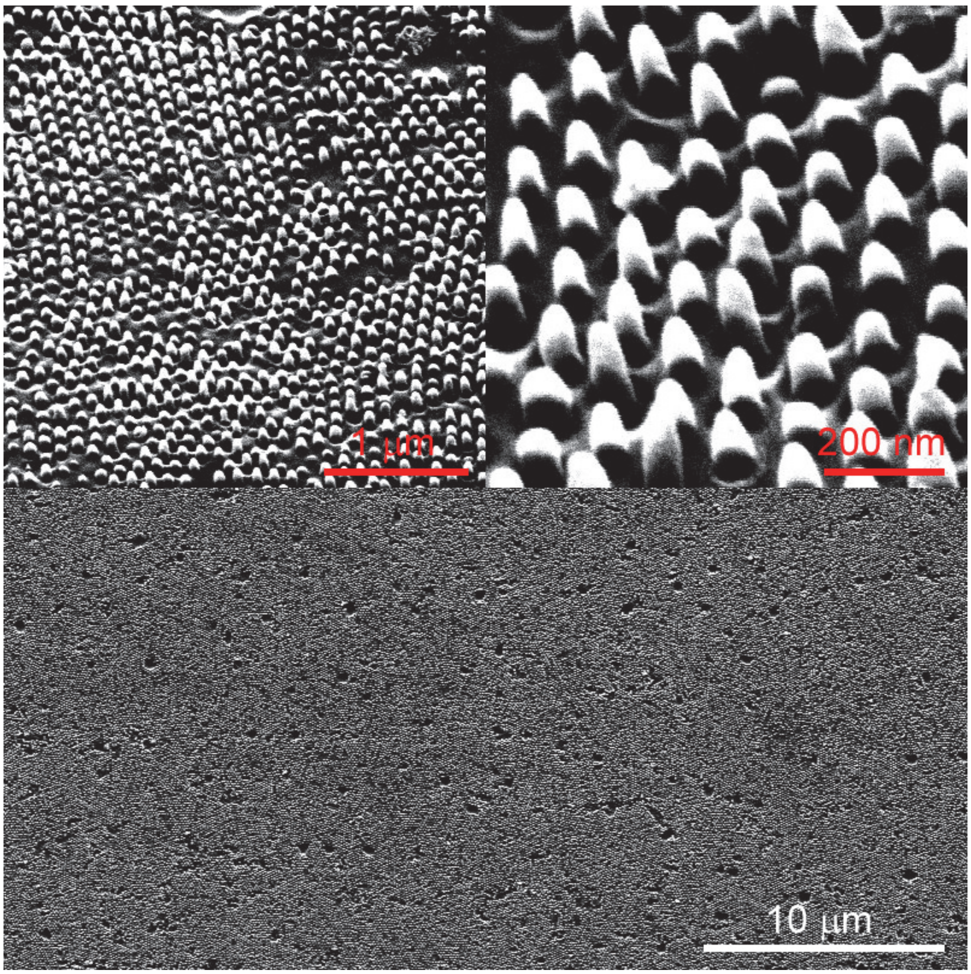

Fig. S1. SEM images of the PC paraboloids are given for the ~150 nm nanostructured film after using the silicon mold for 10 times (top insets show the high magnification images of the same nanostructures). There is not observed any new deformation on the PC paraboloids and images are very similar to first situation (see the Figure 4 in article).

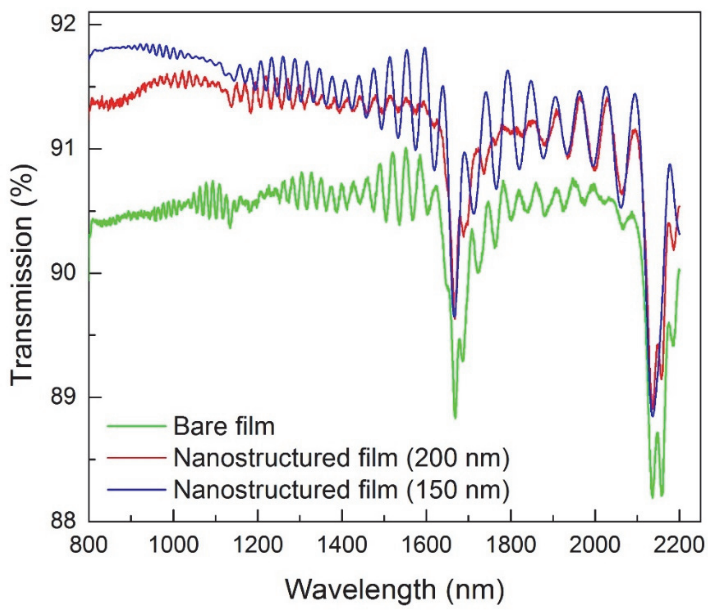

Fig. S2 Measured transmission of the 150 nm and 200 nm nanostructured films are compared with the bare film over a wavelength range from 800 nm to 2200 nm.

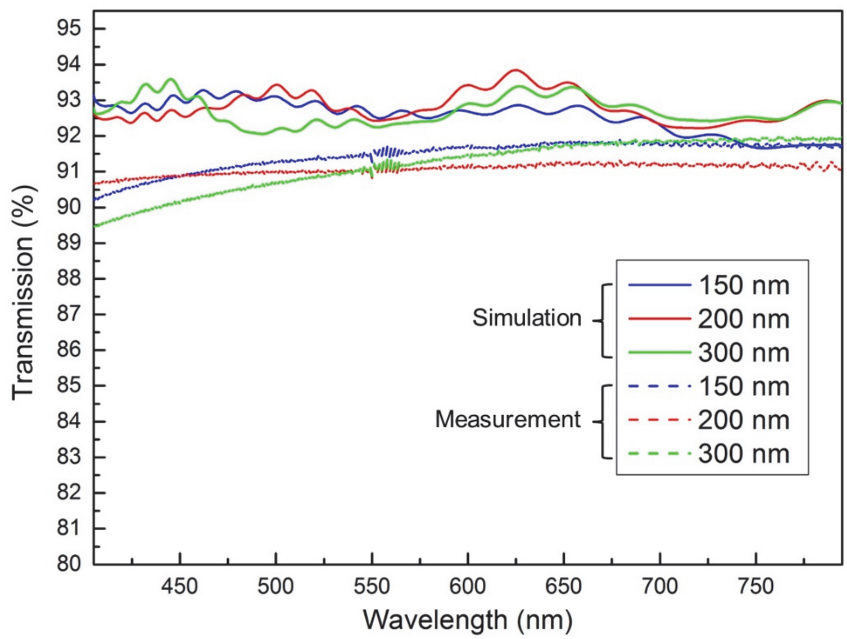

Fig. S3 Simulated and measured transmission spectrum are compared for 150 nm, 200 nm, and 300 nm structured films.

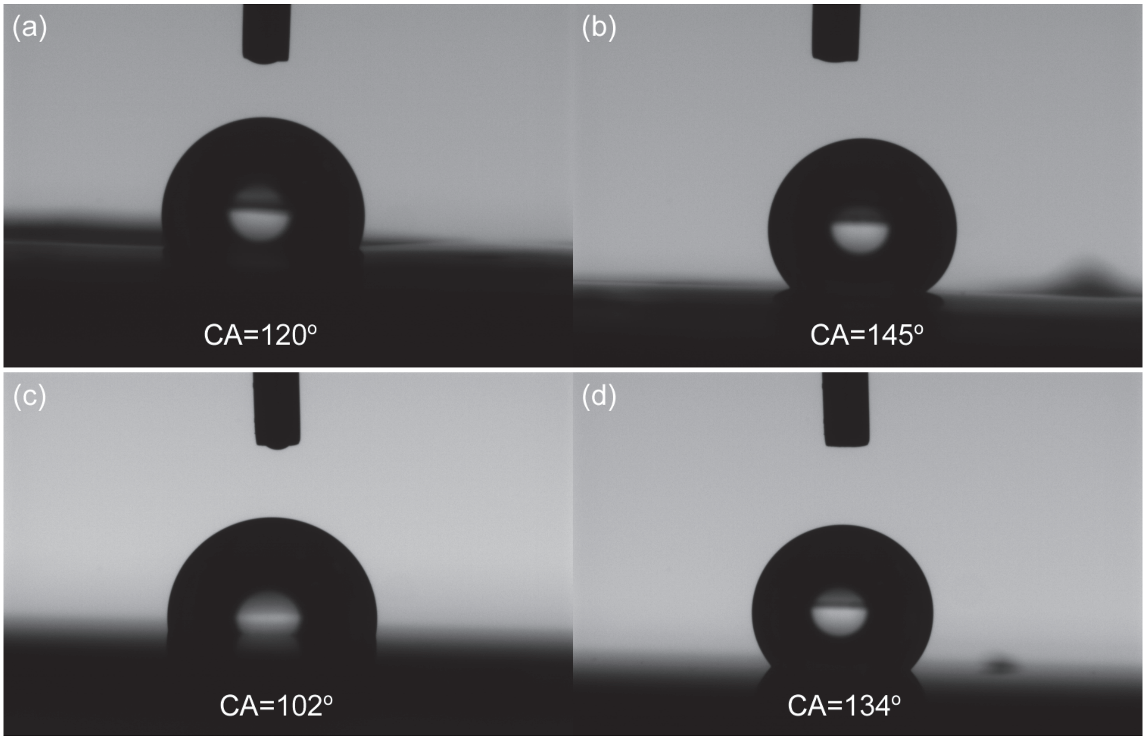

Fig. S4 Close-packed paraboloid nanostructures exhibit hydrophobic character. Water contact angle measurements of (a) the bare film (120º) and (b) 150 nm nanostructured film (145º) are given which is increasing with the nanostructuring. At the last step of silicon mold fabrication process, silicon molds are fluorinated to prevent polymer adherence into the pores. Water contact angle measurements of the silicon mold (c) before (102º) and (d) after (133.8º) fluorination are determined. As expected, there is observed an increase at the contact angles due to the low surface energy of fluorinated ligands.