Supporting Information for

New type high-index dielectric nanosensors based on scattering intensity shift

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Figure S1. Scattering spectra of a L-shape silicon nanostructure under different ambient refractive indexes. (a) Schematic shows the L-type Si nanostructure. (b) The backward scattering spectra under different ambient refractivities. (c) Comparison between L-shape nanostructures and nanospheres. (d) (e) Electric field distributions of nanosphere and L-shape nanostructure when the field enhancement factors are equal. Their locations in spectra are revealed by vertical bar in (c).
**Figure S2.** Calculated backward scattering spectra of silicon nanosphere dimers with different gap distances.
Figure S3. Comparison between different simulated methods. (a) The scattering spectra of silicon nanosphere dimer under different ambient refractive index through setting background refractive index. (b) Scattering spectra of silicon dimer under different ambient refractive index through wrapping nanostructures with cubes with desirable refractive indexes. And scattering spectra near the bottom are the scattering from pure cube, which exclude the obvious intensity changes arise from the scattering from cube. (c) Simulated scattering spectra under 53°C oblique incidence on fluid filled thin layer sandwiched between glasses, which is similar to the situation in experiment.
Figure S4. The influences of ITO substrates (n=1.6) on scattering behaviors of a silicon dimer with diameter of 130 nm in air (a) and in solution (n=1.5; b)
Figure S5. The influences of oblique incidence on scattering behaviors. (a) Schematic shows the oblique incidence (53°; orange arrow) and the ratio between backward and forward scattering collected by dark-field objective. (b) Schematic shows the refraction occurred between solution and cover glass, cover glass and air. (c) Forward and backward scattering from a typical silicon dimer with diameter of 130 nm in ambient refractivity of 1.5.
Figure S6. Measured backward scattering spectra of a single silicon nanosphere in air (n=1) and in water (n=1.33).
Figure S7. Measured scattering spectra of a typical silicon oligomer (left) in air (n=1) and in water (n=1.33). Inset is the corresponding SEM image. The scale bar is 100nm. Calculated scattering spectra of this oligomer (right) in air and in water.
Table S1. The comparison between the sensitivity of silicon dimer and sensitivities of other plasmonic sensors.

<table>
<thead>
<tr>
<th>Nanostructures</th>
<th>Sensitivity (nm, eV or a.u. per RIU)</th>
<th>FWHM or SDSI (standard deviation of scattering intensity)</th>
<th>FOM</th>
<th>Ideal resolution</th>
<th>Sensitivity(counts)</th>
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<tr>
<td>Ag nanocubes(^1)</td>
<td>1.3eV</td>
<td>0.065eV</td>
<td>20</td>
<td>0.0003eV</td>
<td>4333</td>
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<td>Au nanorings(^2)</td>
<td>380nm</td>
<td>23nm</td>
<td>16.5</td>
<td>0.08nm</td>
<td>4750</td>
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<tr>
<td>Au nanocavities(^3)</td>
<td>405nm</td>
<td>19nm</td>
<td>21</td>
<td>0.08nm</td>
<td>5063</td>
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<tr>
<td>Au nanobipyramids(^4)</td>
<td>540nm</td>
<td>120nm</td>
<td>5.4</td>
<td>0.08nm</td>
<td>6750</td>
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<td>Au nanoframes(^5)</td>
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<td></td>
<td>0.08nm</td>
<td>7750</td>
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<td>AuNP@SiO(_2) particles(^6)</td>
<td>737nm</td>
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<td></td>
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<td>Au nanorings(^7)</td>
<td>880nm</td>
<td>440nm</td>
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<td>0.08nm</td>
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<td>Au mushroom arrays(^8)</td>
<td>1010nm</td>
<td>10nm</td>
<td>108</td>
<td>0.08nm</td>
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<td>Ag annular cavity arrays(^9)</td>
<td>1505nm</td>
<td>18nm</td>
<td>85</td>
<td>0.08nm</td>
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<td>Au split-ring resonators(^10)</td>
<td>3366nm</td>
<td>521nm</td>
<td>6.5</td>
<td>0.08nm</td>
<td>42075</td>
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<td>Si nanosphere dimer</td>
<td>11.68</td>
<td>0.1</td>
<td>116.8</td>
<td>0.00001</td>
<td>1168000</td>
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References:


