Antenna array enhanced attenuated total reflection IR analysis in aqueous solution

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S1. Water induced antenna resonance shift on Si and Al_2O_3

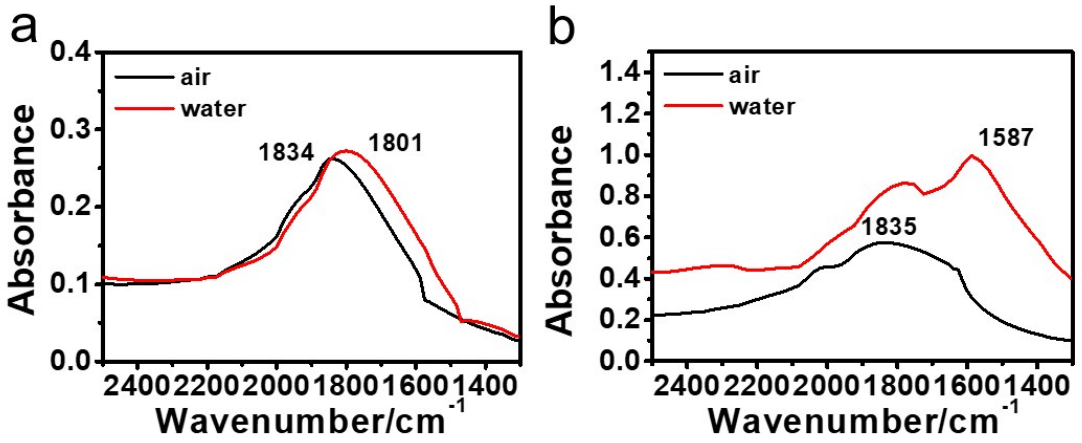

Figure S1. Simulated resonance spectra of the antenna arrays on Si (a) and Al_2O_3 prisms (b) in air and water with p-polarization, respectively.

S2. Details of simulations

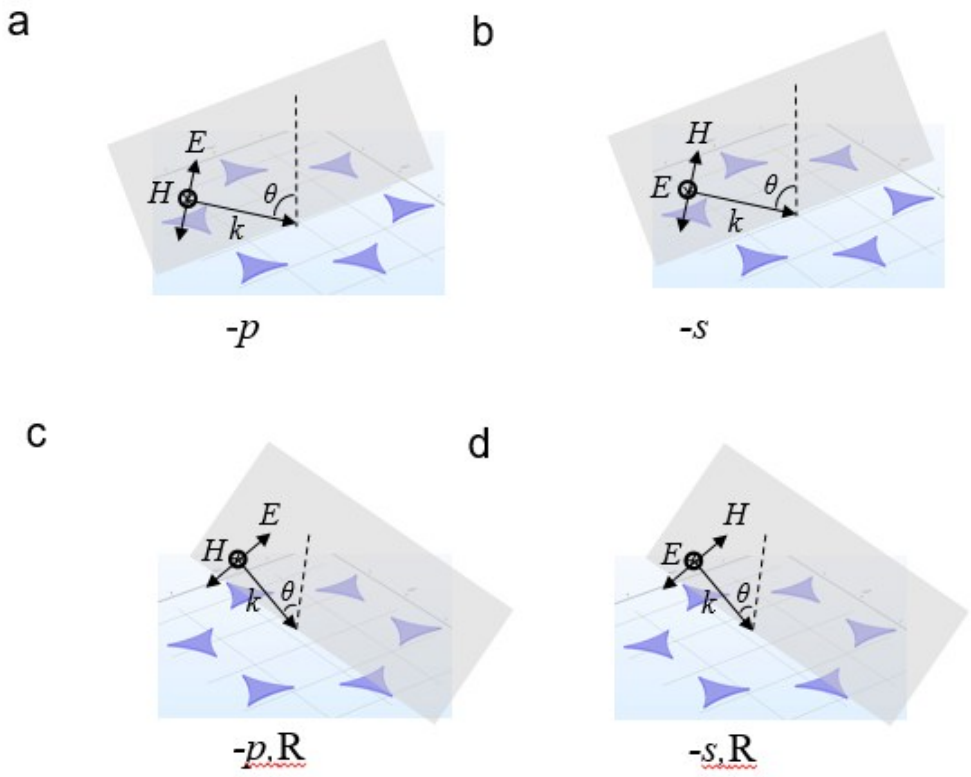

Figure S2. Scheme of the numerical models used in simulations. The simulation parameter of incident angle (θ=70°) in ATR mode is the same as in experiments. (a)The incident light polarization (***E***) is in the incident plane (*p*-polarization, -*p*). (b) ***E*** is in the incident plane perpendicular to the incident plane (*s*-polarization, -s). (c) ***E*** polarization in (a) is 30° or 90° rotated as indicated (-*p*, R). (d) ***E*** polarization in (b) is 30° or 90° rotated as indicated (-*s*, R).

In the present study, numerical simulations are performed using a commercial finite element method (FEM)-based software package (COMSOL Multiphysics). The refractive index of Si prism and water is taken as 3.4 and 1.33, respectively. The permittivity of gold is described by a Lorenz-Drude model.[1] Periodic boundary conditions are applied to the four faces (parallel to the propagation direction) of a simulation domain, mimicking the antenna array shown in Figure 2(c).

Reference

1. A.D. Rakic, A.B. Djurišic, J. M. Elazar and M.L. Majewski. *Appl. Opt.*, 1998, **37**, 5271–5283.