Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Supporting Information

Bound State in the Continuum in Flexible Terahertz Metasurfaces Enabled Sensitive Biosensing

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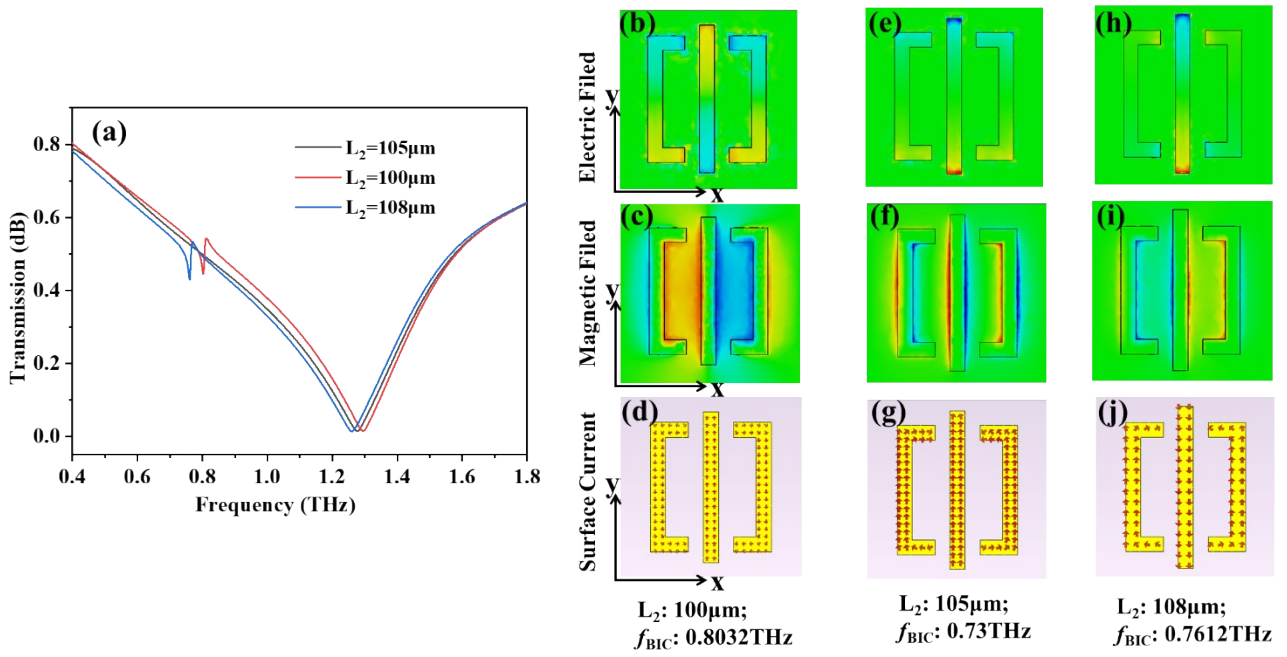

Fig. S1 (a) shows the simulated transmission spectra of the FW-BIC metasurface structures when L_2 is 100, 105, 108μm, especially. **Fig. S1** (b-d) show the Electric field, surface current and magnetic field distributions of the metasurface structures with L_2=100μm, f_{BIC}=0.8032THz; (e-g) L_2=105μm, f_{BIC}=0.73THz; and (h-j) L_2=108μm, f_{BIC}=0.7612THz.

The electric and magnetic fields located at BIC resonant condition were numerically investigated.

According the descript in Fig. 3(a), the ideal BIC is realized when L_2 is about 105 μm and *f* is about 0.73THz, at which state, the linewidth of the resonance frequency is extremally small which can't be figured out by CST simulation. The quasi-BICs approaching ideal BIC are presented in Fig. S1, which still show a toroidal dipole resonance characteristic.

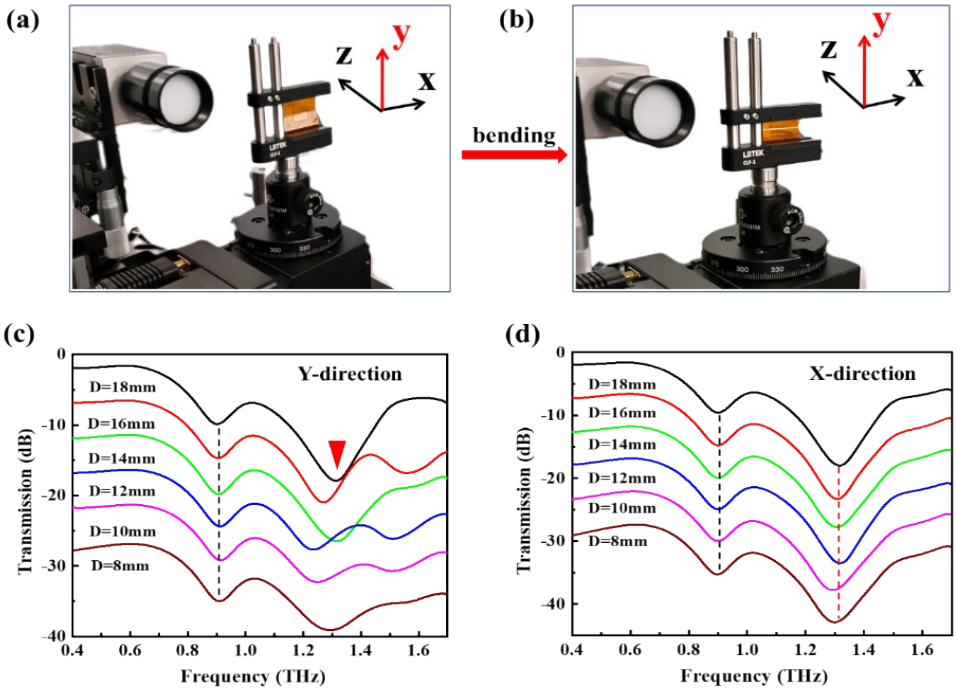

Fig. S2 (a-b) shows the process of force bending of flexible metasurface. **Fig. S2** (c-d) shows the flexible metasurface are subjected to different flexural intensities from the x- and y- directions, respectively, while the incident light is x-polarized light.

To evaluate the mechanical flexibility of our BIC metasurface, we measured not only the transmission spectrum at different bending angles, but also the transmission spectra at different bending directions. **Fig. S2**(a-b) shows the process of force bending of flexible metasurface. With the incident light kept in x-polarization direction (TE mode), the flexible metasurface is subjected to different bending intensities from the x- and y-directions, respectively, as shown in **Fig. S2**(c-d). It can be seen that the quasi-BIC resonance has been stable and unaffected by the external force when we apply the force in the y- direction, while the dipole resonance has a significant frequency shift. And when we apply the force in the x-direction, it can be seen that no changes occur in either the quasi-

BIC resonance or the dipole resonance.

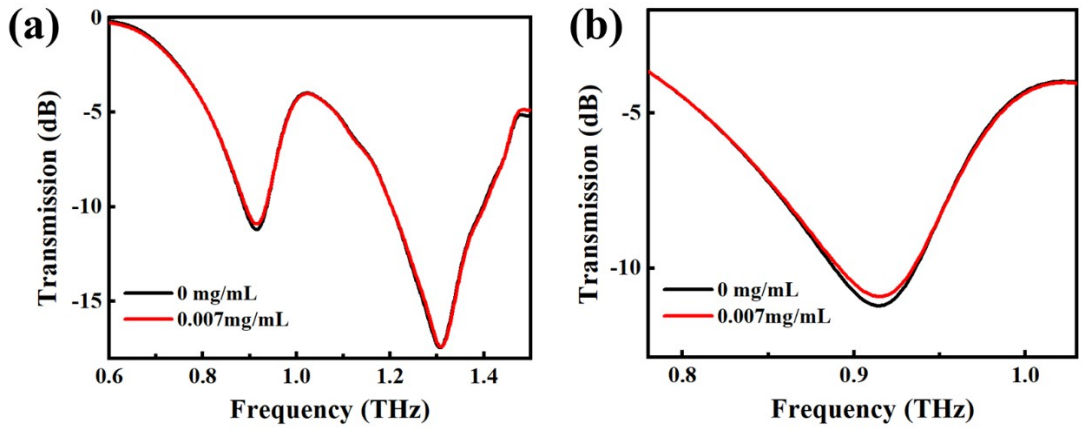

Fig. S3 (a) the detectable concentration of the metasurface can be down to 0.007 mg/mL; (b) Local magnification of Figure a

As shown in **Fig.S3**, in order to explore the concentration detection limit of our metasurface, we finally measured that when the concentration is as low as 0.007 mg/ml, there is no frequency shift in the entire spectrum but only a small amplitude change in the quasi-BIC resonance.