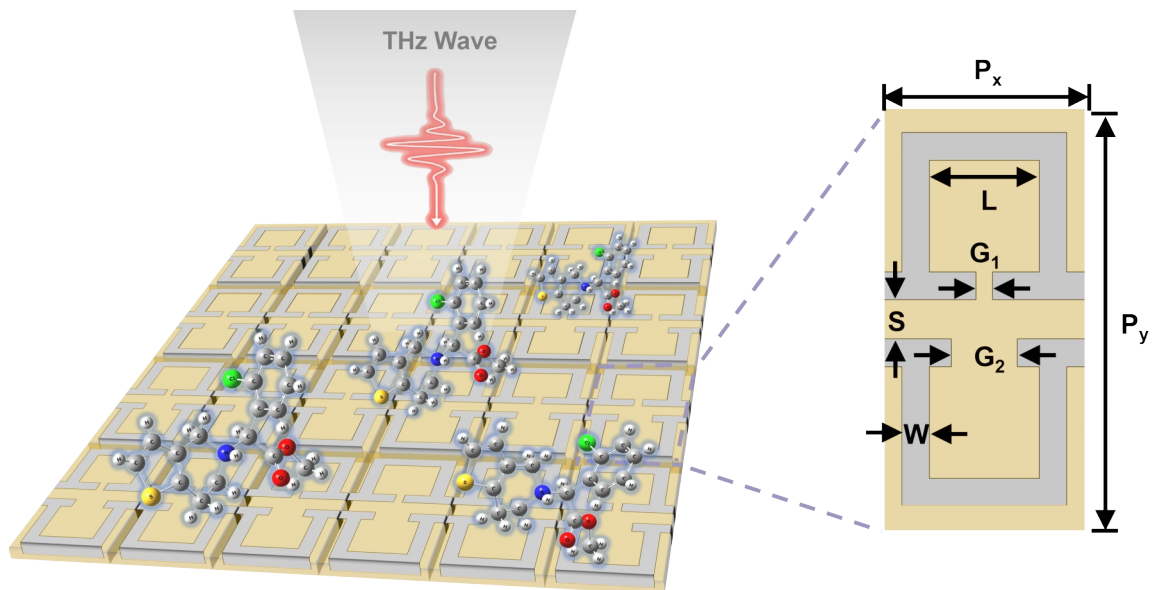


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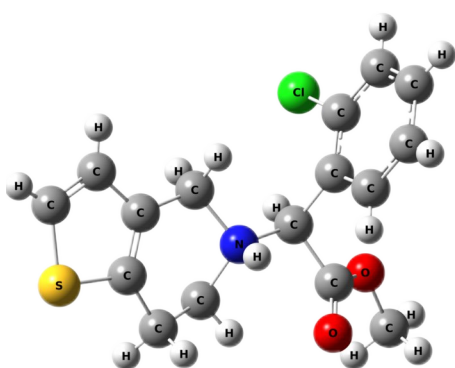
This study used a terahertz metamaterial sensor for the rapid and accurate detection of the antithrombotic drug Plavix addressing the increasing demands for efficiency and sensitivity in drug content monitoring. Utilizing the terahertz vibration characteristics of Plavix characteristic absorption peaks within the 1-3 THz band were identified. Based on these findings a dual-polarization resonance metamaterial sensor was designed to simultaneously enhance the sensing signals of these characteristic absorption peaks. Experimental results indicate that the sensor attains a high level of fit $R^2 > 0.97$ for quantitative analysis in the quantitative detection of Plavix through the established two-indicator decision model. Consequently the terahertz metamaterial sensing technology presented in this study exhibits superior performance in monitoring Plavix content and offers a new tool for clinical drug monitoring and broader biochemical sample analysis.

metamaterial terahertz technology Plavix quantitative detection

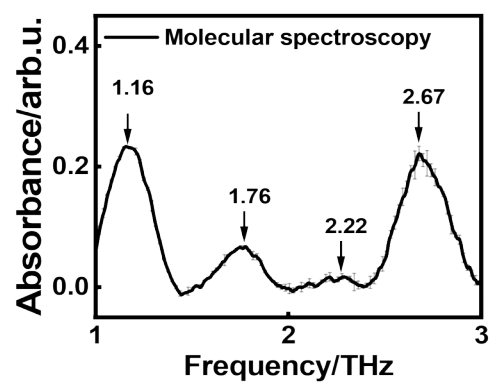


1

Fig. 1 Schematic of the metamaterial sensor structure



(a)



(b)

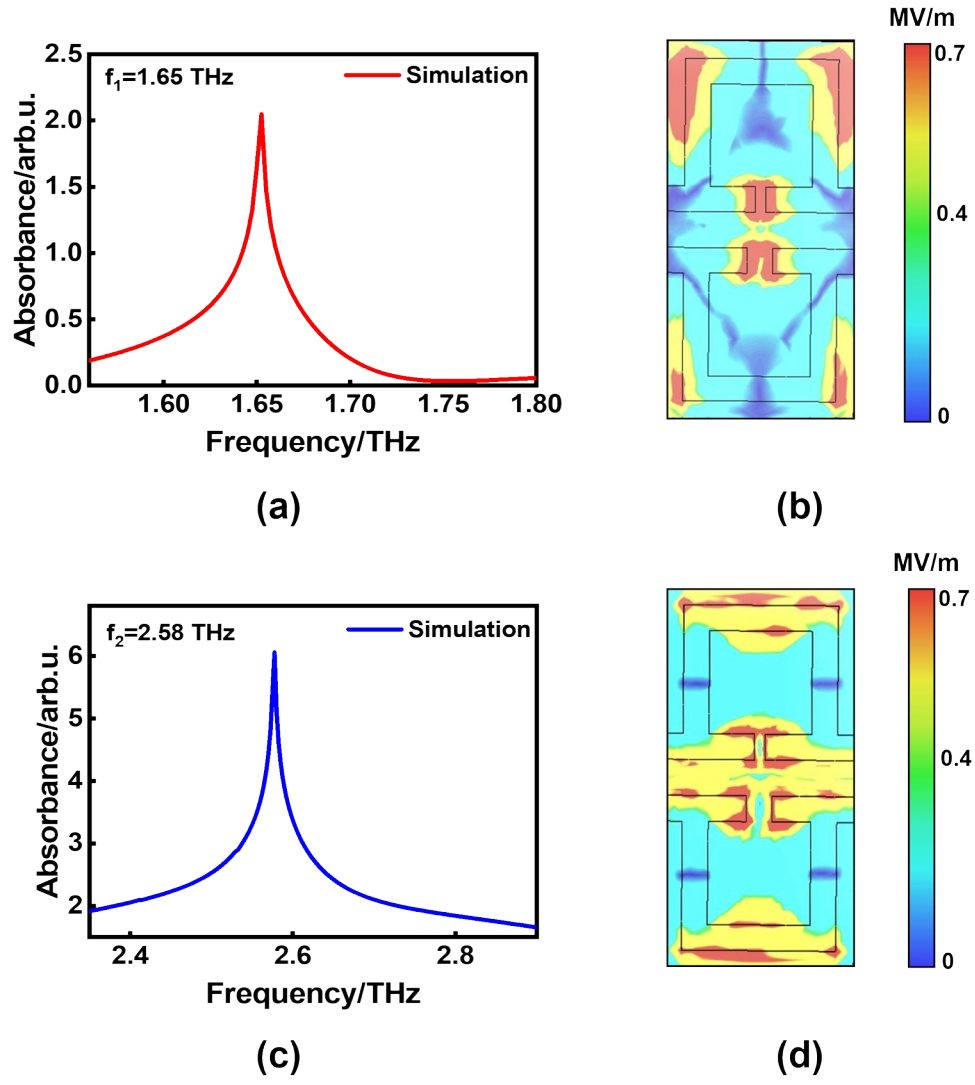
2

Fig. 2 THz characteristic absorption peaks of Plavix

a

b

a molecular structure of Plavix b THz molecular spectrum of Plavix

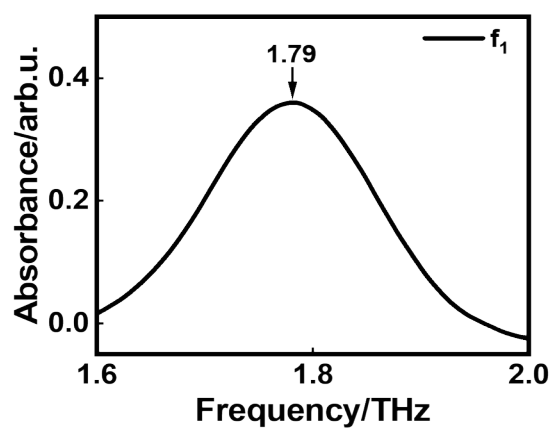


3

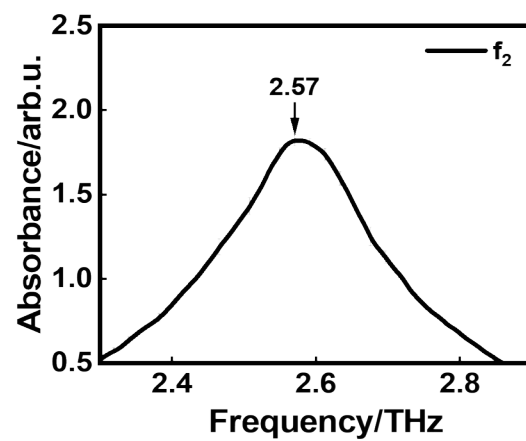
a b f_1

c d f_2

Fig. 3 Resonance peaks of the metamaterial sensor with corresponding electric field distributions a and b show the THz spectrum and field distribution for resonance peak f_1 c and d show those for resonance peak f_2



(a)



(b)

4 a b f_1 f_2
 Fig. 4 Measured THz absorption spectra of the metamaterial sensor a corresponds to resonance peaks f_1 and b corresponds to the resonance peaks f_2

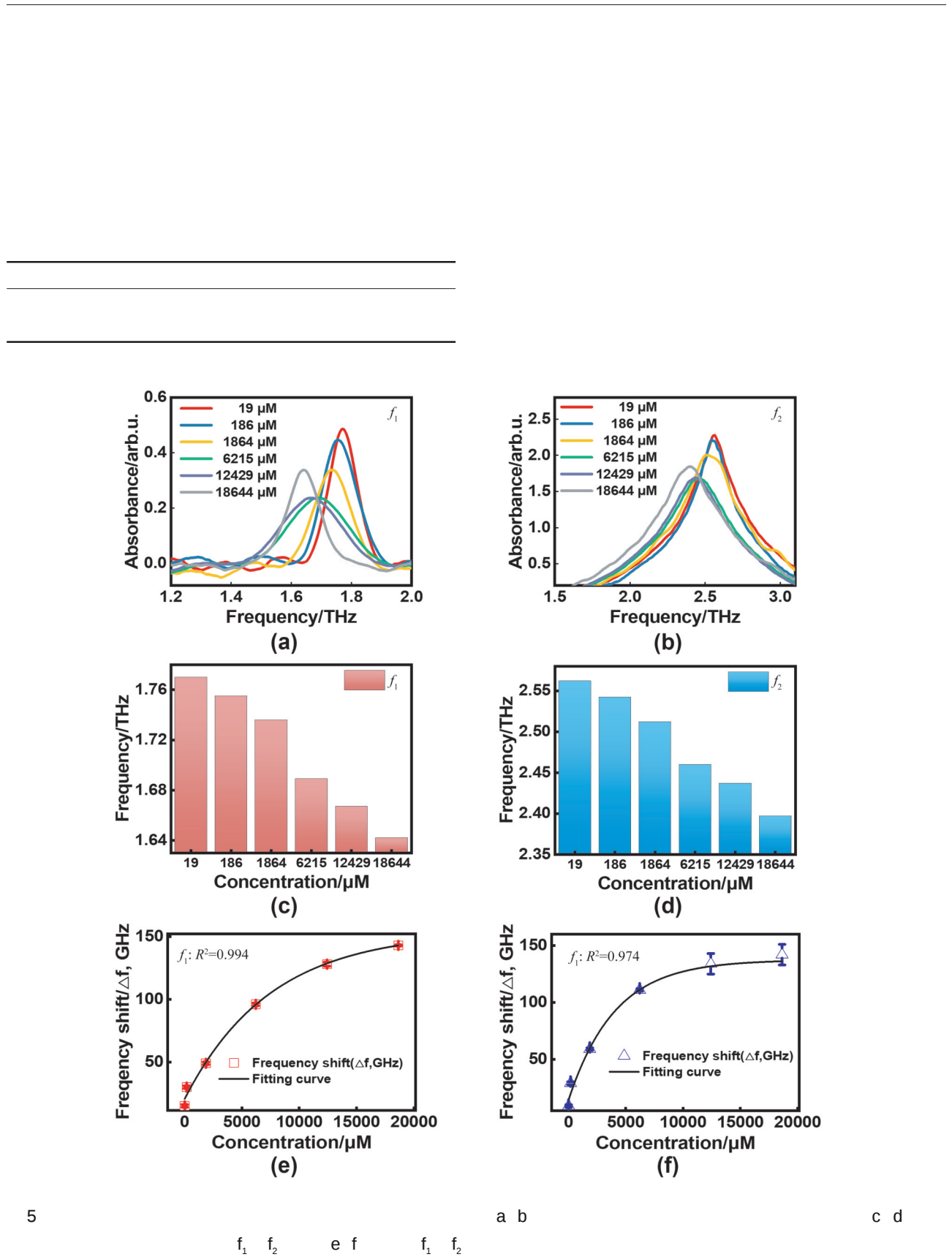


Fig. 5 Quantitative detection results of Plavix solutions at different concentrations based on the THz metamaterial sensor (a) (b) THz absorption spectra of Plavix solutions at different concentrations (c) (d) frequency shifts of resonance peaks f_1 and f_2 caused by Plavix solutions at different concentrations (e) (f) correlation between frequency shifts of resonance peaks f_1 and f_2 and Plavix concentration

