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Title

Label-free THz sensing of living body-related molecular binding using a metallic mesh

Source

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Abstract

We have demonstrated label-free THz sensing of living body-related molecular binding using a thin metallic mesh and a polyvinylidene difluoride (PVDF) membrane. Metallic meshes in the THz region are designed for anomalous transmission phenomena derived from a resonant excitation of surface waves. Additionally, they are designed to have a sharp dip in transmittance. The metallic mesh is very sensitive to a change of the refractive index of materials attached to the metallic mesh. In this paper, we report sensing of interactions between lectin and sugar using this technique. We found that the dip frequency shift, transmittance attenuation of the dip frequency, and peak shift of the derivative spectrum of the phase shift depend on the bonding amount of lectin-sugar interactions. We also applied this technique to detect avidin-biotin interactions, leading to the detection of a small amount of biotin (0.17 pg/mm(2)).