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Title:Detection of deep-subwavelength dielectric layers at terahertz frequencies using semiconductor plasmonic resonators
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Abstract:Plasmonic bowtie antennas made of doped silicon can operate as plasmonic resonators at terahertz (THz) frequencies and provide large field enhancement close to their gap. We demonstrate both experimentally and theoretically that the field confinement close to the surface of the antenna enables the detection of ultrathin (100 nm) inorganic films, about 3750 times thinner than the free space wavelength. Based on model calculations, we conclude that the detection sensitivity and its variation with the thickness of the deposited layer are related to both the decay of the local THz field profile around the antenna and the local field enhancement in the gap of the bowtie antenna. This large field enhancement has the potential to improve the detection limits of plasmon-based biological and chemical sensors.
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