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Title:Lattice resonances in antenna arrays for liquid sensing in the terahertz regime
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Abstract:Terahertz antenna arrays supporting narrow lattice resonances are proposed as an alternative sensor-on-chip approach to liquid sensing. An array of metallic rectangular antennas fabricated on a polyethylene naphthalate (PEN) substrate is used to demonstrate the sensing of a number of fluids. Good agreement is shown between experiment and simulation with Q-factors of around 20 and a figure-of-merit (FOM) of 3.80 being achieved. Liquid sensing with antenna arrays is simple both in terms of fabrication and setup. The working frequency can be tuned with a suitable choice of substrates and array parameters. The nature of the lattice resonance means that the whole sample is used to provide the conditions required for resonance occurrence, eliminating the need to preferentially locate the sample in small areas of high field concentration. The antenna arrays could also potentially be coupled with a microfluidic system for in situ sensing or used in a reflection setup.
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