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Title:Terahertz near-field imaging using subwavelength plasmonic apertures and a quantum cascade laser source

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Abstract:The first demonstration, to our knowledge, of near-field imaging using subwavelength plasmonic apertures with a terahertz quantum cascade laser source is presented. "Bull's-eye" apertures, featuring subwavelength circular apertures flanked by periodic annular corrugations were created using a novel fabrication method. A fivefold increase in intensity was observed for plasmonic apertures over plain apertures of the same diameter. Detailed studies of the transmitted beam profiles were undertaken for apertures with both planarized and corrugated exit facets, with the former producing spatially uniform intensity profiles and subwavelength spatial resolution. Finally, a proof-of-concept imaging experiment is presented, where an inhomogeneous pharmaceutical drug coating is investigated.

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