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Tapered terahertz plasmonic waveguides

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Concentrating optical energy into an ultra-small spot beyond the diffraction limit has long been an interesting topic in photonics. One of the most popular methods is to use subwavelength-sized plasmonic waveguides, based on the excitation of surface plasmon polaritons (SPPs) on metallic surfaces. While most of the studies on plasmonic waveguides have been focused in the optical regime, subwavelength plasmonic waveguides in the THz spectral regime have recently attracted a great deal of attention. Here, we discuss two different types of tapered waveguides which can enable deep subwavelength focusing of broadband terahertz signals. A single wire can support a surface plasmon in the Sommerfeld mode, while a pair of parallel plates can support edge plasmons which effectively confine the electromagnetic wave. In both cases, confinement of the wave to below lambda/100, over a broad spectral bandwidth, is demonstrated.

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