

Efficient terahertz emission from InAs nanowires

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We observe intense pulses of far-infrared electromagnetic radiation emitted from arrays of InAs nanowires. The terahertz radiation power efficiency of these structures is ~ 15 times higher than a planar InAs substrate. This is explained by the preferential orientation of coherent plasma motion to the wire surface, which overcomes radiation trapping by total-internal reflection. We present evidence that this radiation originates from a low-energy acoustic surface plasmon mode of the nanowire. This is supported by independent measurements of electronic transport on individual nanowires, ultrafast terahertz spectroscopy, and theoretical analysis. Our combined experiments and analysis further indicate that these plasmon modes are specific to high aspect ratio geometries.