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Terahertz detection using nanorectifiers

Abstract

We report on the low-temperature detection of free-space radiation at 1.5 THz using a unipolar nanodiode, known as the self-switching diode (SSD), coupled with a spiral microantenna. The SSD, based on an asymmetric nanochannel, has a diode-like characteristic that can be utilized in rectifying high-frequency electrical signals. The truly planar structure of the SSD not only provides intrinsically low parasitic capacitance that enables rectification at ultrahigh speed, but also allows the fabrication of a large SSD array in parallel without the need for interconnection layers. The extrinsic voltage responsivity of the SSD-based detector achieved was ~15.6 V/W, but the estimated intrinsic voltage responsivity was ~45 kV/W

Keywords

Diode; nanotechnology; terahertz (THz) radiation