Abstracts

Reduced low-frequency noise Schottky barrier diodes for terahertz applications

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The Schottky barrier diode remains an important device for detecting and mixing at terahertz frequencies, particularly in plasma diagnostics and atmospheric remote sensing. In plasma diagnostics, plasma density is monitored using a receiver with an IF typically below 10 MHz, thus it is critical to reduce low-frequency excess noise to improve sensitivity. We present here a submicrometer Pt/GaAs diode fabrication process that has resulted in a significant reduction in low-frequency noise over that of commercially available devices. Noise performance is optimized by establishing an even distribution of gallium and arsenic (stoichiometric surface) at the contact surface. The effects of different SiO/sub 2/ deposition and etching techniques are also compared. Diodes fabricated with the optimized procedure have exhibited a signal-to-noise ratio that is three times higher than that of commercially available diodes at 0.9 THz using an IF of 80 kHz, as well as competitive performance at 1.4 THz with an IF in the gigahertz range.

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