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Title:Enhancement of terahertz coupling efficiency by improved antenna design in GaN/AlGaN high electron mobility transistor detectors

Authors:Sun Yun-Fei (1); Sun Jan-Dong (1); Zhang Xiao-Yu (1); Qin Hua (1); Zhang Bao-Shun (1); Wu Dong-Min (1)

Author affiliation:(1) Int. Lab. for Adaptive Bio-Nanotechnol. (i-Lab.), Suzhou Inst. of Nano-Technol. & Nano-Bionics, Suzhou, China

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Abstract:An optimized micro-gated terahertz detector with novel triple resonant antenna is presented. The novel resonant antenna operates at room temperature and shows more than a 700% increase in photocurrent response compared to the conventional bowtie antenna. In finite-difference-time-domain simulations, we found the performance of the self-mixing GaN/AlGaN high electron mobility transistor detector is mainly dependent on the parameters L_{gs} (the gap between the gate and the source/drain antenna) and L_w (the gap between the source and drain antenna). With the improved triple resonant antenna, an optimized micrometer-sized AlGaIn/GaN high electron mobility transistor detector can achieve a high responsivity of 9.45×10^2 V/W at a frequency of 903 GHz at room temperature.

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