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