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标题: Ultrahigh sensitive plasmonic terahertz detector based on an asymmetric dual-grating gate HEMT structure
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摘要: We report on ultrahigh sensitive, broadband terahertz (THz) detectors based on asymmetric dual-grating-gate (A-DGG) high electron mobility transistors, demonstrating a record responsivity of 2.2 kV/W at 1 THz with a superior low noise equivalent power of 15 pW/root Hz using InGaAs/InAlAs/InP material systems. When THz radiation is absorbed strong THz photocurrent is first generated by the nonlinearity of the plasmon modes resonantly excited in undepleted portions of the 20 electron channel under the high-biased sub-grating of the A-DGG (as a quadratic nature of the product of local carrier density and velocity perturbations), then the THz photovoltaic response is read out at high-impedance parts of 2D channel under the other sub-grating biased at the level close to the threshold. Extraordinary enhancement by more than two orders of magnitude of the responsivity is verified with respect to that for a symmetric DGG structure. (C) 2012 Elsevier Ltd. All rights reserved.
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