



High Detectivity Quantum Well Infrared Photodetectors

By Yao, Jie

Condition: New. Publisher/Verlag: VDM Verlag Dr. Müller | QWIP Noise and Detectivity at Low Temperatures | "High Detectivity Quantum Well Infrared Photodetectors" was Dr. Jie Yao's Ph.D. thesis at the Electrical Engineering Department of Princeton University in October 2000. This dissertation describes the characterization, optimization and physics of the high-detectivity Quantum Well Infrared Photodetector (QWIP) and Infrared Hot-Electron Transistor (IHET). We performed high-sensitivity measurements on the dark current and the noise current of IHETs and their constituent QWIPs at 4.2K. The dominant noise of the QWIPs in this regime is not from the expected shot noise but from the $1/f$ noise and a bias-independent noise. By filtering out the tunneling dark currents, the IHETs reduce the dark current and the $1/f$ noise associated with the impurity-assisted tunneling current, and improve the detector sensitivity and uniformity. We optimized an infrared hot-electron transistor (IHET) to achieve a high detectivity. This large D is accomplished by using a low filter barrier at the collector to achieve large photocurrent transference. The filter barrier of the IHET blocks the tunneling current and hence its noise at the collector and thus improves the detector sensitivity. | Format: Paperback | Language/Sprache: english | 100 pp.



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