**Design and Fabrication of a Very Low Peak Voltage InGaAs/AlAs Resonant Tunneling Diode Incorporating Highly Strained Quantum Well**

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ABSTRACT

An InGaAs/AlAs resonant tunneling diode (RTD) with highly strained quantum well grown by molecular beam epitaxy (MBE) at a low temperature of 430°C exhibited an extremely low peak voltage (VP) of ~0.23 V (0.41 V) in forward (reverse) direction at room temperature. The atomic-layer precision of molecular beam epitaxy (MBE) in growth control resulted in a very low peak voltage and simultaneously high peak current density of ~ 450 kA/cm2 and ~ 790 kA/cm2 in forward and reverse direction, respectively, mainly due to the exceptional interface quality and low series resistance. The MBE-fabricated RTD demonstrated superior scalability and reverse-bias performance compared to MOVPE-grown counterparts. In this work, the design and fabrication of a submicrometer InGaAs/AlAs RTD were successfully demonstrated using conventional optical lithography suitable for application in low DC-input RTD-based terahertz (THz) sources.