

SIRKELI, Vadim, YILMAZOGLU, Oktay et al. Resonant tunneling and quantum cascading for optimum room-temperature generation of THz signals. In: IEEE Transactions on Electron Devices. 2017, Vol.64, Issue 8, pp. 3482 - 3488. ISSN 0018-9383.

We report on the results of a numerical study of quantum transport in ZnSe-based resonant-tunneling diodes (RTDs) and quantum cascade oscillators (QCOs) with fixed and unequal barrier heights. It is found that the negative differential resistance exists up to room temperature in the current-voltage characteristics of the RTD and QCO devices with unequal barrier heights. Further, we demonstrate that QCOs with unequal barrier heights have a better frequency and power performance characteristics compared with RTDs and are more beneficial for high-power terahertz generation at room temperature. For the best QCO device with 100 periods of quantum cascading, a maximum output power of $\sim 7-9 \mu\text{W}$ for the operating frequency range from 0.1 to ~ 6 THz at room temperature was achieved.