Asada Lab

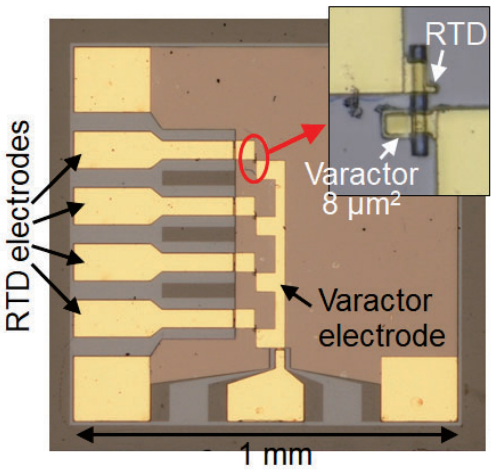
Ultra-Small Semiconductor Terahertz Sources

Quantum Nano-Electronics Core,
Laboratory for Future Interdisciplinary Research for Science and Technology

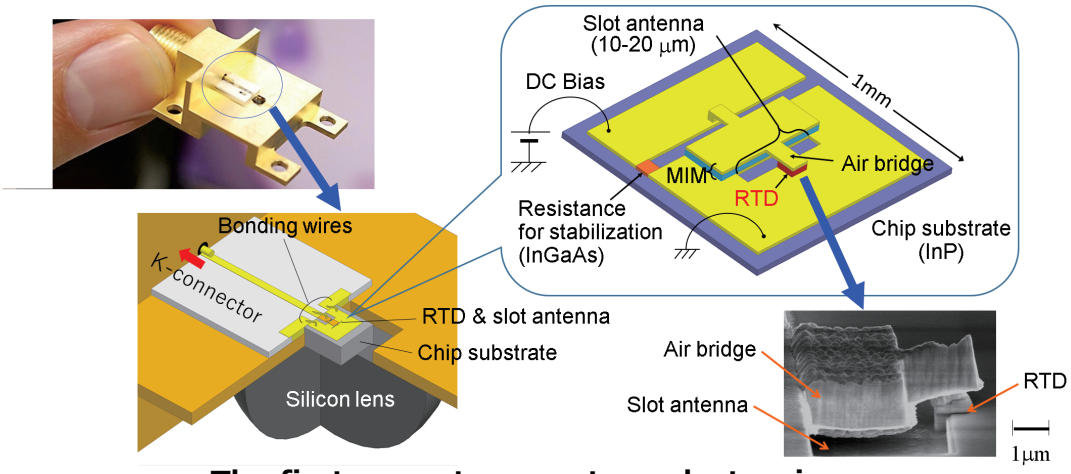
http://www.pe.titech.ac.jp/AsadaLab/

- Devices for generation and detection of terahertz waves
- Terahertz oscillators using resonant tunneling diodes
- Integrated terahertz devices for various applications
- Wireless terahertz communications

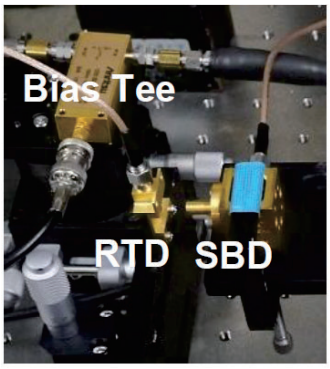
Various applications are expected in the terahertz frequency range (ca. 0.1-10 THz), and realization of semiconductor sources with high power, room-temperature operation, and compactness is strongly desired. In this laboratory, oscillation of room-temperature electronic single devices at the highest frequency, 1.98 THz, was achieved with a resonent tunneling diode (RTD), which is one of the quantum nano-devices. The present research is aiming at high-performance operation of this source and application to high-capacity communications beyond 50 Gb/s, spectroscopy, and radars.



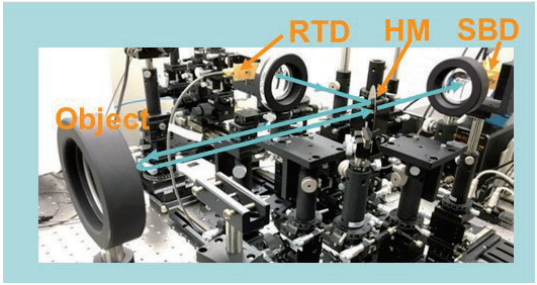
Frequency tuning terahertz oscillator for spectroscopy

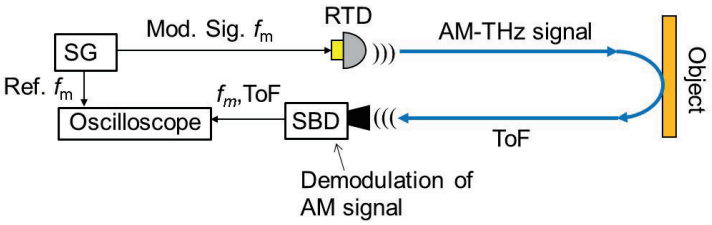


The first room-temperature electronic oscillator above 1 THz using RTD.



Wireless terahertz data transmission system





Ranging system toward 3D imaging and radars with terahertz waves.