

# Effect of Molecular Beam Epitaxy Growth Conditions for Terahertz Sensing InGaAs Diodes

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InGaAs-based bow-tie diodes for terahertz (THz) range are found to be well-suited for development of compact THz imaging systems [1]. To further optimize design for sensitive and broadband THz detection, one of the major challenges remains to understand influence of growth conditions and role of defects for device operation. We present detailed study of photoreflectance and THz sensitivity of InGaAs bow-tie diodes.

Figure 1 depicts the sensitivity as a function of current for all types of the studied samples at frequencies of 0.3 THz and 0.6 THz. As it is seen, sensitivity of InGaAs bow-tie diodes fabricated from the wafers B203 and B204 increases while raising the current and reaches 17.5 V/W and 10 V/W at 0.3 THz and 12.5 V/W and 7 V/W at 0.6 THz, respectively, at the bias current of 0.2 mA.

To conclude, the THz detectors layers grown with beam equivalent pressure In/Ga ratio equal to 2.06 are found to be well suited for fabrication of room temperature bow-tie THz detectors enabling sensitivity of 13 V/W at 0.6 THz due to strong built-in electric field effects [2].

## REFERENCES

- [1] G. Valušis et al., "Compact solutions for spectroscopic solid-state-based terahertz imaging systems," in *Terahertz Emitters, Receivers, and Applications VIII*, 2017, p. 27.
- [2] V. Palenskis et al., "InGaAs Diodes for Terahertz Sensing—Effect of Molecular Beam Epitaxy Growth Conditions," *Sensors*, vol. 18, no. 11, p. 3760, Nov. 2018.

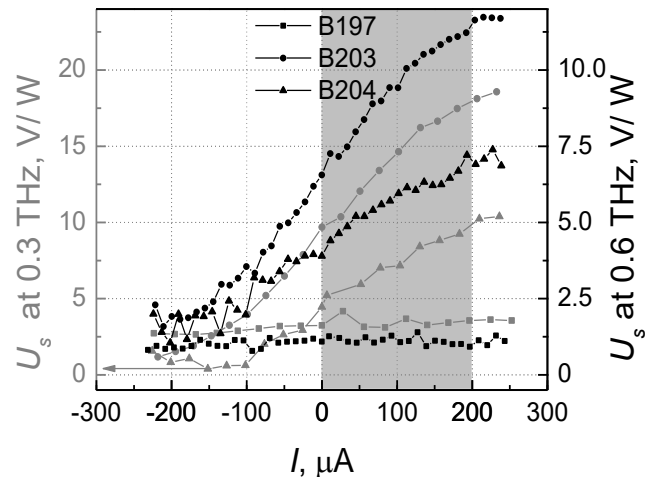


Fig. 1 Voltage sensitivity of the InGaAs diode detector with different In/Ga ratios at 0.3 THz and 0.6 THz frequency with modulation frequency of 1 kHz (adapted from [2]).