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Tunable THz Source with Harmonic Multiplier Based on Superlattice Structures

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Abstract— The traditional approach to obtain high-stable generators has involved frequency multiplication of high-stable reference synthesizers. The Schottky diodes are widely employed for developing of multipliers, mixers and detectors of THz frequency range. However, for a successful operation in the THz region, it is necessary to increase cutoff frequency of Schottky diodes that has proven quite difficult due to fundamental restrictions (high inertness of electron pass through an active zone and parasitic capacitances). Use of superlattice structures are expected to be more effective for frequency transformation since the lower values of inertness and parasitic capacitances and presence of negative differential conductivity (up to 1 THz) on the volt-ampere characteristic. In the report we present high stable tunable radiation sources (frequency synthesizers and generator of harmonics), operating up to 6.3 THz. It is based on solid-state Gunn generator (97.5-117.5 GHz) and frequency multiplier on superlattice structures. Spectral parameters of generated harmonics are investigated. The elaborated source was used in THz spectrometer.