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Noise spectral density calculation of different CdTe Metal-semiconductor-metal contacts

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The Cadmium telluride Schottky diodes are widely used for several applications [1], specifically as spectroscopic detectors. The actually CdTe Schottky devices are composed of thick semiconductor (S) layer (in mm) coated by two metals (M) contacts, therefore they have M–S–M common structure form. The CdTe M-S-M structure presents a high signal-noise ratio depends to the intrinsic noise level. Particularly, the fluctuations of the electric field at Schottky contacts lead to the fluctuations of leakage current [2] where their properties change by the choice of metal contact. An additional component of noise becomes from the fluctuations of free carrier inside the whole Schottky barrier region, which depend to the perturbation of the electric field inside the whole structure.

This contribution presents an analytical approach for the current noise calculations of Schottky CdTe for three different contacts (Au, Al, and In). The calculations taking into account the fluctuations of the electric field, of the leakage current through Schottky barrier at the M-S interface, and of the surface charge density current. The fluctuations of electric field in different CdTe Schottky contacts exhibit a sharp resonance followed by decreasing in gigahertz and terahertz frequencies, respectively (see Fig. 1).

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