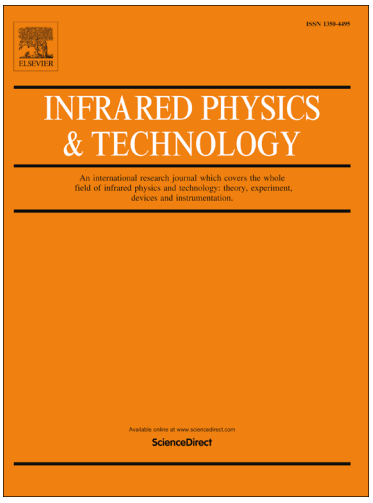

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Study of dark current for LWIR HgCdTe detectors with a graded doped junction

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Abstract

Long-wavelength infrared detection is the cutting-edge technique for third-generation infrared remote sensing. However, the performance of long-wavelength infrared detector still limits to the dark current characteristics and associated noise behavior. This work investigates the performance of doping changed long-wavelength planar HgCdTe infrared photodiode to better understand the dark current transport of ion implanted devices. The measured dark current characteristics exhibit strong correlation with the p-type doping concentration which are explained well by established numerical models. Considering the interaction of Hg-interstitial and Hg-vacancy, a graded junction simulation architecture is adopted and the accuracy of this structure is proved by the simulation results in comparison with the experiments. Our results show that the graded n-type region doping with Gaussian distribution more accurately reflect the tunneling current under large reverse bias. Besides, it is the different doping concentration inducing significant effect on band-to-band tunneling which leads to I-V characteristics changing. The work described in this letter provides theoretical basis for the dark current formation of doping changed long-wavelength HgCdTe detectors.

Key words: doping changed, dark current, LWIR, HgCdTe infrared detectors

1 Introduction

Detection in long-wavelength range (8-14μm) is essential for the rich information of CO_2