Modeling and Analysis Impact Ionization Effect on Excess Noise and Gain in InAs Avalanche Photodiode for Short-Wave and Mid-Wave Infrared Application

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In this thesis, analysis the leakage current, avalanche gain, excess noise and frequency response of InAs avalanche photodiode has been done. Impact ionization and excess noise of device with only electron impact ionization has been analysed in the Lumerical software and with focusing on parameters such as the electron ionization coefficient & hole ionization cofficient, the impact ionization rate , the avalanche multiplication coefficient and the bias voltage, related curve has been extracted in the temperature range 77K to 300K. A significant reduction in excess noise and increase in the gain of InAs avalanche gain photodiodes observed.

Keywords : Keywords: Impact ionization, leakage current, avalanche gain, excess noise, frequency responce