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Investigation of annealing effects for CdTe pn diodes fabricated by laser-induced doping method

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CdTe has been used as radiation detectors at room temperature. Impurity doping of CdTe has been considered difficult because it requires high temperature heat treatment and characteristics are degraded. However, the laser doping method that we have recently developed is overcoming this problem. When doping semiconductors, not all dopants act as donors or acceptors, and some of them become defects in the crystal. In response to the presence of such inactive dopants, for example, ion implantation undergoes an annealing process to promote the activation of the dopants. On the other hand, when CdTe is annealed above 150℃, the characteristics of diodes and detectors are degraded, such as increased reverse current and decreased hole mobility. Therefore, annealing has been considered difficult for CdTe. The I-V characteristics of CdTe pn diodes doped by laser-induced backside doping do not degrade when heat-treated above 150℃, and in fact I-V properties are improved. Therefore, it was assumed that annealing of CdTe might be possible because the characteristic degradation due to annealing that has been reported could not be measured. In this study, the CdTe pn diodes fabricated by the laser doping method was annealed and investigated the annealing effect. The annealing process was carried out from 100℃ to 400℃. The spectral properties of CdTe diodes during long time measurement can indicate In diffusion in Schottky detector due to annealing. The result of PL measurement can indicate dopants activate due to anneal above 300℃. Details will be discussed on the day.

Topics

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