

CATHODOLUMINESCENCE IN CdTe WITH PHOSPHOROUS DOPED  
BY CHEMICAL DIFFUSION

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ABSTRACT

Optical and electrical properties of CdTe doped with phosphorous by chemical diffusion method have been studied. One Phosphorous new luminescence band has been observed. This band which appears at 1.540 eV (8053 Å) at 4.2 K can be explained in terms of simple donor-acceptor model. The donor-acceptor emission from 1.350 - 1.450 eV has been decreased in excess of phosphorous and band edge emissions disappeared. The disappearance of band edge emission was proposed to be due to the screening effect of phosphorous impurities, when the phosphorous was diffused into CdTe crystal.

INTRODUCTION

The optical properties of chemically doped phosphorous in CdTe have received little attention due to these two reasons. Primarily, recent interest of checking ion implantation results in II-VI compounds for luminescence studies, and comparing them after doped impurities with chemical diffusion method and secondly to grow low resistivity and highly pure CdTe single crystal and diffusing impurities by stoichiometry control method has been possible in the recent years. The electrical properties of phosphorous impurities doped by chemical diffusion method in CdTe have been reported previously [1,2]. Also the electrical properties of the other binary semiconductors doped with phosphorous like CdSe and ZnTe have been reported [3,4]. Again, the optical properties of phosphorous diffused in ZnTe have been reported [5,7]. When phosphorous was diffused in ZnTe crystal for cathodoluminescence study, the band edge emissions disappeared as reported by authors [8,9], but they have not mentioned the reason of disappearance of these edge emissions.

When phosphorous was diffused in CdTe crystal the band edge emissions also disappeared. The disappearance of band edge emissions is possibly due to the screening effect of phosphorous