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Au doped p-type $Hg_{1-x}Cd_xTe$ layers grown by MBE

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$Hg_{1-x}Cd_xTe$ is currently one of the most widely used semiconductor materials for infrared detector arrays. For p-type doping in $Hg_{1-x}Cd_xTe$, group I elements, such as Li, Cu, Ag, and Au can easily be incorporated into metal sites during MBE growth and subsequent annealing.

Unfortunately, the large diffusion coefficient of these elements in $Hg_{1-x}Cd_xTe$. and, group V element As(arsenic), which has a low diffusivity in $Hg_{1-x}Cd_xTe$, has been preferred over the group I elements for extrinsic acceptor doping. However, the amphoteric behavior of arsenic, since it occupies both metal and nonmetal sites, giving donor and acceptor character, respectively, complicates the doping process. But, recently, it was reported that p-type, Ion implantation Au-doped $Hg_{1-x}Cd_xTe$ epilayers grown by LPE have good characteristic result. In this study, we will first explain in-situ Au-doped $Hg_{1-x}Cd_xTe$ layers grown by MBE. $Hg_{1-x}Cd_xTe$ samples used for this study were grown on CdTe/Si(211)B Substrate in a Riber 2300 MBE machine and have different gold cell temperature.

Fourier transform infrared (FTIR) spectroscopy and double crystal x-ray rocking curve (DCRC) measurements at room temperature followed the crystal growth in order to determine the composition (x value of $Hg_{1-x}Cd_xTe$) and crystalline quality of the as-grown $Hg_{1-x}Cd_xTe$ layers. Electrical characterizations using the Hall effect with the Van Der Pauw method and lifetime of photoconductive decay measurement were also conducted at room temperature and 77K.