

**Study on the second phase formation during the MOCVD growth of
InGaAs/InGaAsP MQW structure on the grated InP substrate**

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The InGaAs/InGaAsP multi-quantum well (MQW) distributed feed back (DFB) lasers have been investigated very extensively because of their application to high speed optical communications. Since the DFB system require fine grating, the epitaxial growth of MQW on grated substrate is very important. In this work, five period of InGaAs/InGaAsP MQW structures were grown on grated InP with InGaAsP buffer layer by MOCVD under various growth conditions and the interface between InGaAsP layer and grated InP was investigated using TEM.

First-order gratings with height of 150 nm were formed on InP substrate by holographic techniques and chemical etching. For the growth of main MQW layers, grated InP substrates were heated up to 869 K with flow of PH₃. However, for this sample thermal deformation was observed. In order to prevent the grating from thermal deformation, InP substrate is heated up with the flow of both PH₃ and AsH₃. For this sample, the height of grating was well preverved but precipitates were formed at the interface betwee InP and InGaAsP layer especially at the low curvature regions. Moreover, dislocations were formed at the precipitates and propagated through the layers. According to the EDX analysis, the precipitate is found to be InAsP phase. The formation mechanism of InAsP precipitate will be discussed and optimum condition for the growth of InGaAs/InGaAsP MQW on grated InP substrate will be also presented.