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THERMODYNAMIC ASPECTS OF ORGANOMETALLIC VPE

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Abstract. - Organometallic vapor phase epitaxy (OMVPE) is a new crystal growth technique which is rapidly gaining popularity due to its simplicity, flexibility and proven ability to grow excellent quality III/V compounds and alloys for device applications.

The fundamental aspects of OMVPE are only beginning to be understood. It is often classified as a "kinetically controlled" growth process. While this is true to some extent, thermodynamics play a major role overall. Two particular aspects of OMVPE growth of III/V ternary and quaternary alloys will be examined from a thermodynamic point of view:

1. Distribution coefficients in systems such as \( \text{InAs}_{1-x}\text{Sb}_x \) and \( \text{GaAs}_{1-x}\text{Sb}_x \) will be analyzed.

2. The occurrence of miscibility gaps in III/V systems, in particular observations and calculations of miscibility gaps in III/V alloys such as \( \text{InP}_{x}\text{As}_{y}\text{Sb}_{1-x-y} \) and \( \text{GaAs}_{1-x}\text{Sb}_x \) grown by OMVPE will be discussed.

In this paper experimental observations will be discussed in terms of calculations made using simple thermodynamic models of III/V solid alloys.