THERMODYNAMIC ASPECTS OF ORGANOMETALLIC VPE

G.B. Stringfellow

Department of Electrical Engineering, University of Utah, Salt Lake City, Utah 84112, U.S.A.

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 OMPVE 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 $InAs_{1-x}Sb_x$ and $GaAs_{1-x}Sb_x$ 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 $InP_xAs_ySb_{1-x-y}$ and $GaAs_{1-x}Sb_x$ 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 .