ATOMIC LAYER EPITAXY BY ISOTHERMAL CLOSED SPACE SUBLIMATION

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Abstract. Atomic Layer Epitaxy growth of optoelectronic semiconductors ZnTe, CdTe and Cd$_x$Zn$_{1-x}$Te and CdSe films is achieved by using a novel isothermal closed space sublimation system. The quality of the films and the Atomic Layer Epitaxy regime was confirmed by X-Rays and electron diffraction, Transmission Electron Microscope observations and composition measurement of the ternary Cd$_x$Zn$_{1-x}$Te alloys. The difference in vapor pressures between the elemental source and the growing surface is the driven force for the growth; this difference being zeroed once the surface is completely. ZnTe growth is regulated at 1 ML/cycle while CdTe is regulated at 0.5 ML/cycle.

1 Introduction

Atomic Layer Epitaxy (ALE)[1] is a technique where components coming from elemental sources are deposited alternately onto a growing surface. At adequate temperatures, the growth is self-regulated at one or less monolayers (ML) per cycle. This growth regime allows good control and reproducibility of films thickness, and probably enhances the two-dimensional growth mode. It is the number of cycles (and not the exposure time or the fluxes) that determines the film thickness. For this, the technique is particularly good for the growth of heterostructures, like needed in optoelectronic devices. Up to now, ALE has been obtained by using non-equilibrium techniques like MBE and MOCVD. In these systems, the self-regulation occurs because the dependence of the sticking coefficient with the surface coverage and temperature. In general, there is a temperature “window” in which the sticking coefficient is zero for complete surface