

1023-Z1-1381

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The technology of crystal growth has advanced enormously during the past two decades. Among these advances, the development and refinement of molecular beam epitaxy (MBE) has been among the most important. Surface segregation and solute trapping during planar film growth is one of the important issues in MBE, yet the study on surface composition has been largely restricted to experimental work. This paper introduces some mathematical models of surface composition during planar film growth. Analytical solutions are obtained and they match quite well with the experimental results. (Received September 27, 2006)