

Growth of epitaxial heterostructures

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Abstract. Recent advances in solid state sciences include for example the discovery of new, topologic, electronic phases of matter or the evidence of emergent phenomena at interfaces between two materials having distinct electronic and/or magnetic properties. In such a context, thin film growth plays a crucial role: the ability to grow state of the art heterostructures paves the way towards the study of new phenomena and properties. In this lecture, the fundamental concepts of thin film growth will be introduced. The kinetic and thermodynamic aspects of nucleation and growth of heterostructures [1, 2] will be discussed and the different growth modes will be detailed. A particular emphasis will be put on epitaxial structures that enable strain engineering of the physical properties. The basic principles of molecular beam epitaxy (MBE) and pulsed laser deposition (PLD) will be exposed. Methods to monitor the growth in situ in real time and ex situ will also be discussed. Recent examples taken from the literature, in which the growth of state-of-the-art epitaxial heterostructures (either by MBE or PLD) is crucial, will illustrate the points introduced during this lecture

References

- [1] J. A. Venables, *Introduction to Surface and Thin Film Processes* (Cambridge University Press, Cambridge, 2000)
- [2] H. Lüth, *Solid Surfaces, Interfaces and Thin Films* (Springer-Verlag, Berlin Heidelberg, 2001)

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