

1.2.4 Artificial Structures: Superlattices and Quantum Wells

Epitaxial crystal growth techniques such as molecular beam epitaxy (MBE) and metal organic chemical vapor deposition (MOCVD) allow one to have monolayer ($\sim 3 \text{ \AA}$) control in the chemical composition of the growing crystal. Nearly every semiconductor extending from zero bandgap ($\alpha\text{-Sn, HgCdTe}$) to large bandgap materials such as ZnSe, CdS, AlN etc., has been grown by epitaxial techniques. This allows growth of quantum wells and heterostructures where electronic properties can be altered. Heteroepitaxial techniques allow one to grow heterostructures with atomic control, one can change the periodicity of the crystal in the growth direction. This leads to the concept of superlattices where two (or more) semiconductors A and B are grown alternately with thicknesses d_A and d_B respectively. The periodicity of the lattice in the growth direction is then $d_A + d_B$. A (GaAs)/(AlAs) heterostructure is illustrated in figure 1.7.

In figure 1.8, we show a cross-sectional TEM image of a structure containing InGaAs/GaAs and AlGaAs/GaAs superlattices, indicating the precision with which these structures can be produced using modern epitaxial growth techniques.

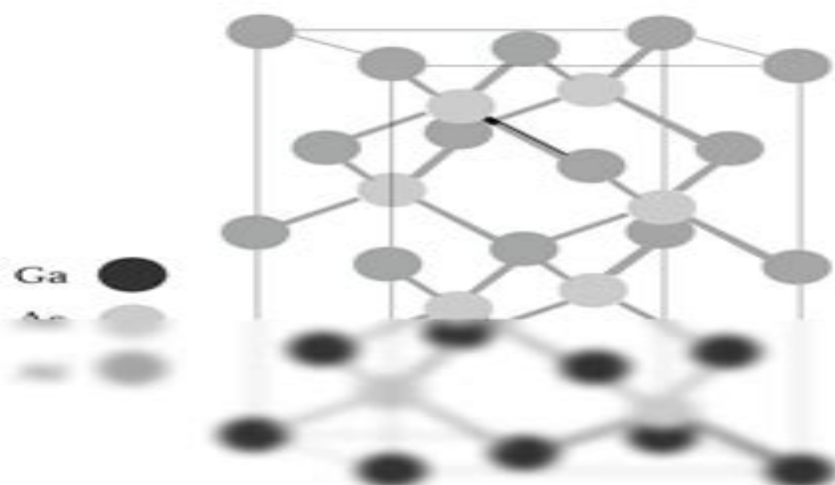


Figure 1.7: Schematic diagram of a crystal structure showing the growth of a superlattice structure using MBE or MOCVD.

Quantum Wells And Superlattices In Optoelectronic Devices And Integrated Optics Spie Vol 861

Wenbin Ji



Quantum Wells And Superlattices In Optoelectronic Devices And Integrated Optics Spie Vol 861:

This book delves into Quantum Wells And Superlattices In Optoelectronic Devices And Integrated Optics Spie Vol 861. Quantum Wells And Superlattices In Optoelectronic Devices And Integrated Optics Spie Vol 861 is a vital topic that needs to be grasped by everyone, from students and scholars to the general public. The book will furnish comprehensive and in-depth insights into Quantum Wells And Superlattices In Optoelectronic Devices And Integrated Optics Spie Vol 861, encompassing both the fundamentals and more intricate discussions.

1. This book is structured into several chapters, namely:
 - Chapter 1: Introduction to Quantum Wells And Superlattices In Optoelectronic Devices And Integrated Optics Spie Vol 861
 - Chapter 2: Essential Elements of Quantum Wells And Superlattices In Optoelectronic Devices And Integrated Optics Spie Vol 861
 - Chapter 3: Quantum Wells And Superlattices In Optoelectronic Devices And Integrated Optics Spie Vol 861 in Everyday Life
 - Chapter 4: Quantum Wells And Superlattices In Optoelectronic Devices And Integrated Optics Spie Vol 861 in Specific Contexts
 - Chapter 5: Conclusion
2. In chapter 1, the author will provide an overview of Quantum Wells And Superlattices In Optoelectronic Devices And Integrated Optics Spie Vol 861. This chapter will explore what Quantum Wells And Superlattices In Optoelectronic Devices And Integrated Optics Spie Vol 861 is, why Quantum Wells And Superlattices In Optoelectronic Devices And Integrated Optics Spie Vol 861 is vital, and how to effectively learn about Quantum Wells And Superlattices In Optoelectronic Devices And Integrated Optics Spie Vol 861.
3. In chapter 2, this book will delve into the foundational concepts of Quantum Wells And Superlattices In Optoelectronic Devices And Integrated Optics Spie Vol 861. This chapter will elucidate the essential principles that must be understood to grasp Quantum Wells And Superlattices In Optoelectronic Devices And Integrated Optics Spie Vol 861 in its entirety.
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6. In chapter 5, the author will draw a conclusion about Quantum Wells And Superlattices In Optoelectronic Devices And Integrated Optics Spie Vol 861. This chapter will summarize the key points that have been discussed throughout the book. The book is crafted in an easy-to-understand language and is complemented by engaging illustrations. This book is highly recommended for anyone seeking to gain a comprehensive understanding of Quantum Wells And Superlattices In Optoelectronic Devices And Integrated Optics Spie Vol 861.

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