Quantum Well and Optoelectronic Devices

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The confinement of a particle in a one-dimensional quantum well is a fundamental problem of quantum physics and it is addressed in most Quantum Physics textbooks [1]. The purpose of this literature review is to address the theory behind the Quantum Well problem and explain how it can be used for Optoelectronic devices. Firstly, the theory of the 1-D infinite potential well is briefly discussed. In the infinite potential well the particle is confined inside the well due to the infinite potential walls. As a result of this confinement, the energy of the particle is quantized. The more realistic finite well which has finite potential walls is also discussed. Next, the concept of a heterojunction is explained, and the review focuses on how a Quantum Well can be experimentally realised [4]. A heterojunction is a junction of two different semiconductors, with different band-gaps. The difference in the band gaps leads to energy discontinuities in the Conduction Band and Valence Band edges [2]. These discontinuities are used for the engineering of the Quantum Well [3]. After that, the physical properties of a Quantum Well are analysed [2][3]. In the final part of the review, applications to Optoelectronic devices are discussed, with an emphasis on Quantum Well High Intensity LEDS [3]. LED stands for light emitting-diode. A light emitting-diode is a pn junction diode in which a photon is emitted due to the electron-hole pair recombination. The use of a Quantum Well heterostructure for making the LED more efficient will be thoroughly discussed [2].

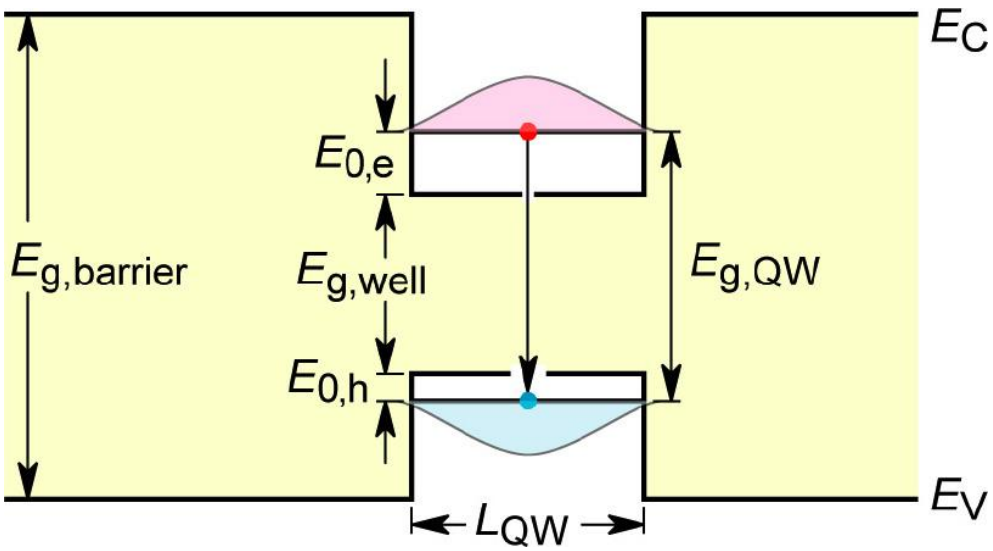

Figure 1: A Quantum Well Heterostructure
Source: https://tinyurl.com/y2blfsx4

References

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