CURRENT CARRIER CAPTURE BY A QUANTUM WELL IN A CdTe-Hg1-xCdxTe-CdTe DOUBLE HETEROSTRUCTURE

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The present-day technology makes it possible to fabricate both simple and complex structures with an electron gas of lowered dimensionality. Among the structures is a double heterostructure of the CdTe-Hg1-xCdxTe-CdTe type in which a Hg1-xCdxTe narrow-band semiconductor is a quantum well. Its band-gap width can vary with change in composition and take on arbitrary small values, down to zero. Consequently, the probability of the current carrier capture by a quantum well in such a heterostructure turns out to be sensible to quantum well parameters and to the band-gap width of the narrow-band semiconductor. In the paper, it is calculated the probability of the charge carrier capture by a dimensionally- quantized well at the emission of a non-polar optic phonon. It is assumed that an electron, having emitted one phonon, may be captured in irreversible way by one of discrete well layers. From the obtained expression, it follows that the capture probability is dependent upon the well width as well as upon the active-layer band-gap width. There have been considered the limit cases of the parabolic energy spectrum and strongly non-parabolic energy spectrum of current carriers. It has been shown that resonance peaks for designated values of the quatum well width with reduction in the Hg1-xCdxTe band gap width displace towards the side of large energies.

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