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Optimisation of the Tunable Wavelength Hot Electron Light Emitter

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Abstract: We report on the optimization of the hot electron tunable wavelength surface light emitting device developed by us. The device consists of a p-GaAs, and n-$Ga_{1-x}Al_xAs$ heterojunction containing an inversion layer on the p- side, and GaAs quantum wells on the n- side, and is referred to as HELLISH-2 (Hot Electron Light Emitting and Lasing in Semiconductor Heterojunction). The device utilises hot electron longitudinal transport and, therefore, light emission is independent of the polarity of the applied voltage. In order to optimise the operation of the device a theoretical model that calculates the tunnelling and the thermionic components of the hot electron injection into the active region, was developed. The optimised structure, based on our model calculations is shown to have an operation threshold field about a factor of 3 lower than the earlier devices.

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